REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	April 1995	

4. TITLE AND SUBTITLE
Pain Predictors In Selected Postoperative Patients.

5. FUNDING NUMBERS

6. AUTHOR(S)
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7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
AFIT Students Attending:
University of Nebraska

8. PERFORMING ORGANIZATION REPORT NUMBER
AFIT/CI/CIA
95-023

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
DEPARTNEMT OF THE AIR FORCE
AFIT/CI
2950 P STREET, BDLG 125
WRIGHT-PATTERSON AFB OH 45433-7765

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for Public Release IAW AFR 190-1
Distribution Unlimited
BRIAN D. GAUTHIER, MSgt, USAF
Chief Administration

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

14. SUBJECT TERMS

15. NUMBER OF PAGES
80

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT

PAIN PREDICTORS IN SELECTED POSTOPERATIVE PATIENTS

by

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A RESEARCH PROJECT

Presented to the Faculty of

The Graduate College in the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Master of Science in Nursing

Graduate Nursing Program

Under the Supervision of

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Medical Center

Omaha, Nebraska

April, 1995

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Acknowledgements

I am indebted to many who have participated in the fulfillment of this project. Without their support and assistance this project wouldn't have been possible.

To God, I owe my life. He is the One who has given me the abilities and faith to persevere regardless of circumstance, and to accomplish all that I have in my life and my career.

To my loving wife, Chris, who has sacrificed a great deal during this time. Thank you for your encouragement, patience, understanding, love, and support. Your reward will be eternal.

To my son, Paul, thank you for making adjustments in your life which enabled me to study during this time.

To my research partners, Joanne and Dorothy, my sincere appreciation for your support, humor, and encouragement. What a process we've experienced through planning, collecting, and analyzing our data. I wish you both the best in your respective careers.

Special recognition must be extended to my research advisors, Dr. Zimmerman and Dr. Pozehl. Your expertise, patience, encouragement, and support have been invaluable. Thank you for your patience and instruction. Thank you for guiding me through this learning experience.

To the secretarial staff, professors, and fellow nursing students in the UNMC College of Nursing, a sincere thanks for your moral support and assistance these past two years. God bless you all.

Finally, a special thank you to the United States Air Force, for allowing me this opportunity to pursue an advanced education without the pressures of full-time employment.

Abstract

This descriptive study described postoperative pain for 106 patients in a midwestern metropolitan hospital undergoing total hip arthroplasty (THA, $\underline{n}$ = 21), total knee arthroplasty (TKA, $\underline{n}$ = 44), or microlumbar discectomy (MLD, $\underline{n}$ = 41); and ascertained factors that predicted postoperative pain. Postoperative pain was assessed using the McGill Pain Questionnaire (MPQ) and a "0" to "10" Numeric Rating Scale (NRS). Postoperative pain was described as most intense during the first 28 hours following surgery (MLD $\underline{M}$ = 4.0, THA $\underline{M}$ = 3.1, TKA $\underline{M}$ = 4.3), and intermittently throughout the first 3 postoperative days during periods of decreased pain medications. Preceding pain intensity ratings were the strongest predictors of subsequent postoperative pain intensity ratings (Beta = .29 to .70). This study indicates more attention should be focused on preceding pain intensity ratings and more adequate analgesia in the immediate postoperative period.

Chapter 1

Purpose of the Study

Postoperative pain is an unpleasant subjective experience (Acute Pain Management Guideline Panel, 1992; Donovan, 1990; Huskisson, 1974; Marks & Sachar, 1973; McCaffery & Beebe, 1989; Walding, 1991) and has been insufficiently managed in the past (Benzon, 1989; Cohen, 1980; Donovan, 1990; Lavies, Hart, Rounsefell & Runciman, 1992; Marks & Sachar, 1973; Melzack, Abbott, Zackon, Mulder & Davis, 1987). Part of the problem has been that many physicians have been prescribing inadequate amounts of narcotics postoperatively (Acute Pain Management Guideline Panel, 1992; Cohen, 1980; Donovan, 1990; Marks & Sachar, 1973). Perhaps of more significance is that some nurses tend to undermedicate their patients even when adequate medication is available (Cohen, 1980; Donovan, 1990; Marks & Sachar, 1973). Effective management of postoperative pain can be an important determinant in overall patient recovery. Furthermore, effective pain relief can facilitate essential postoperative activities such as coughing, deep breathing, ambulation, and physical therapy (Acute Pain Management Guideline Panel, 1992).

No one spends more time with postoperative patients than the nurse. Therefore, nurses play a vital role in the assessment, management, evaluation, and documentation of the postoperative pain experience (Donovan, 1990). Recent guidelines established by the Agency for Health Care Policy and Research (AHCPR) suggest evaluation studies be performed to determine the effectiveness of pain assessment and management procedures. Recent literature has focused on evaluative studies; however, there is a paucity of literature describing the postoperative pain experience of patients undergoing total hip arthroplasty (THA), total knee arthroplasty (TKA), or microlumbar discectomy (MLD) surgery as well as the specific factors predicting their pain.

Specific Aims

The specific aims of this study are:

1. To describe postoperative pain over time for patients undergoing total hip arthroplasty (THA), total knee arthroplasty (TKA), or microlumbar discectomy (MLD).

2. To identify specific patient characteristics and demographic factors that predict postoperative pain ratings in patients undergoing total hip arthroplasty (THA), total knee arthroplasty (TKA), or microlumbar discectomy (MLD).

Definitions

The following definitions were used in this study:

1. Pain: The International Association for the Study of Pain (IASP) defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage." (IASP, 1979, p. 250). Margo McCaffery defines pain as, "... whatever the experiencing person says it is, existing whenever the experiencing person says it does." (McCaffery & Beebe, 1989, p. 7). McCaffery and Beebe also feel the meaning of pain and the words used to describe pain vary for each individual and can vary in the same person over time. Therefore, pain is a subjective experience described best by the individual experiencing the pain. In this study the multidimensional components of pain are defined as scores on the MPQ and the intensity of pain is defined as scores on the NRS.

2. Microlumbar Discectomy (MLD): Microscopic surgery of the lumbar area of the back to remove a portion of a bulging or ruptured disc. Lumbar laminectomies or vertebral fusions were not included.

3. Total Hip Arthroplasty (THA): The total replacement of a hip joint with a prosthetic device. Hip fractures, pinnings, or partial revisions were not included.

4. Total Knee Arthroplasty (TKA): The total replacement of a knee joint with a prosthetic device. Partial revisions of knee components were not included.

Limitations

This study is limited by the small convenience sample size used. The sample was fairly homogeneous in the areas of race (caucasian) and religion (protestant). A more heterogenous group may produce variances from the findings presented in this study. Intraoperative anesthesia was not standardized which may have influenced some postoperative pain scores and or the patients' description of pain. Therefore, results may be limited to the specific populations and setting used in this study.

Significance

Acute postoperative pain can be controlled and managed. Acute postoperative pain results mainly from the physiologic, sensory, and emotional aspects of actual or potential tissue damage as a result of surgery, trauma, inflammation, or disease processes (Acute Pain Management Guideline Panel, 1992). Generally in acute postoperative pain, when the condition causing the pain is corrected and controlled, the pain is alleviated. Current treatment for postoperative acute pain is usually well defined and can be highly effective if managed and controlled (Miaskowski, 1993).

With advances in technology, effective pain management is becoming more attainable; and with increasing consumer knowledge, effective pain management is more in demand and is expected. In 1992, the AHCPR released guidelines for acute pain management for clinical practice. These guidelines, based on published scientific literature and professional knowledge, reflect the current state of knowledge for appropriate and effective pain management in an attempt to attenuate the incidence and intensity of acute pain (Acute Pain Management Guideline Panel, 1992).

The preferred method of postoperative pain management recommended by the AHCPR guidelines is prevention of pain before, during, and after surgery or therapeutic procedures, rather than treatment of established pain. Unrelieved postoperative pain may lead to delayed wound healing, delayed bowel functioning, impaired mobility, thrombosis, or respiratory complications. The prevention approach can have short-term and long-term benefits such as decreased postoperative complications and possibly decreased length of hospital stay (Acute Pain Management Guideline Panel, 1992).

There is a need for studies utilizing systematic pain assessment. Studies by Donovan and her colleagues (1990) have consistently shown that systematic assessments of pain are rare in hospital settings. Therefore, this study will utilize a systematic assessment to describe and predict postoperative pain. Donovan, Dillon, and McGuire (1987) recommend studies that identify the factors contributing to pain in medical-surgical patients. Furthermore, if certain verbal pain descriptors can be identified with certain patient populations, it may be possible to use pain descriptors to measure outcomes of pain management interventions (Wagstaff, Smith & Wood, 1985). Therefore, a thorough understanding of the patient's subjective experience of postoperative pain and the factors that may predict pain may provide the health care team with vital information necessary to develop specific guidelines and enhance nursing interventions to better manage postoperative pain. This understanding may also enhance theory development by providing necessary information describing the postoperative pain experience in these populations. This knowledge may also help the health care team communicate more clearly concerning pain, evaluate the effectiveness of pain interventions, and document more clearly the events surrounding the pain experience. In addition, the knowledge obtained from this study may help support therapeutic

management strategies or plan new strategies that may even help prevent some postoperative pain from occurring.

Chapter 2

Literature Review

Introduction

It is estimated that 88 million Americans suffer from acute or chronic pain each year at a cost of at least $60 billion per year; and this is without putting a value on the amount of suffering associated with the pain (Mooney, 1991). Many individuals undergoing THA, TKA, and MLD have had chronic pain, some for many years. This study concentrated on the acute postoperative pain experience in these populations.

One of the most common postoperative symptoms is pain. Postoperative pain does not always gradually decrease over time as some may posit (Tittle, Long & McMillan, 1992). In a study by Melzack et al. (1987), 31% of postoperative patients experienced substantial pain beyond the fourth postoperative day. Tittle, et al. found that a majority of postoperative abdominal surgical patients (N = 100) experienced less pain on postoperative day three than on day one. However, up to 20% had more pain on day three than on day one, and pain was never completely relieved for any patient. The lowest mean level of pain intensity was 2-3 on a 0-10 scale. If health care providers believe that postoperative pain gradually decreases over time, and therefore automatically administer less narcotics with each postoperative day, some patients may be at risk for being undermedicated. This is compounded by the subjective nature of pain that makes the postoperative pain experience unique. Edwards (1990) reports that patients undergoing the same operation by the same surgeon on the same day have reported dramatically different pain intensity levels.

Postoperative Pain Assessment and Management

In the past, little emphasis has been placed on assessment of the patient's pain experience, or the evaluation of the effectiveness of nursing interventions. However, pain assessment is a fundamental

nursing activity required for successful pain management (Walding, 1991). The nurse uses the assessment process to gather important information related to the patient's pain. This information will assist the health care team in understanding the pain experience, its affect on the patient's life, and the effectiveness of any interventions made. Since pain is not a static experience, but can vary, the nursing assessment must be ongoing as well. A thorough assessment will ensure an accurate understanding of the individual pain experience which will allow for effective planning, implementation, and evaluation of pain relief strategies. A thorough assessment is necessary for patient goals to be actualized and to aid the health care team in determining the appropriate approach to treatment (Walding).

Numerous studies have revealed the inadequate assessment and treatment of postoperative pain (Cohen, 1980; Donovan et al., 1987; Edwards, 1990; Marks & Sachar, 1973; Melzack et al., 1987; Sriwatanakul et al., 1983). These studies have revealed that 31-75% of postoperative patients suffered unrelieved moderate to severe postoperative pain. Current technology and pharmacologic agents are capable of effectively managing postoperative pain. Yet the health care team, who are responsible for managing postoperative pain, have been inadequately treating postoperative pain (Acute Pain Management Guideline Panel, 1992; Cohen, 1980; Edwards, 1990). This literature suggests that it is important to continue systematic pain assessments beyond the third and fourth day postoperatively (Tittle et al., 1992; Melzack et al., 1987). It also suggests that pain control interventions should be individualized based on the patient's description of pain rather than by standardized methods (Acute Pain Management Guideline Panel, 1992). Zimmerman, Duncan, Pozehl, and Schmitz (1987) suggest the multidimensional aspects of pain should be included in pain assessments along with pain intensity.

Pain Description

According to the AHCPR guidelines, the most reliable source of the existence and intensity of pain is the patient's self-report (Acute Pain Management Guideline Panel, 1992). Therefore, the patient's description of pain is what should be used by the health care team to manage and evaluate the effectiveness of pain interventions. However, Camp and O'Sullivan (1987) report little research exists that focuses on the patient's description of postoperative pain. Tittle, et al. (1992) examined how pain was described in patients having abdominal surgery (N = 100). As many as 75 out of 78 McGill Pain Questionnaire (MPQ) descriptors were chosen indicating how differently pain is described by individuals undergoing the same type of surgery. This suggests that patients do not describe pain in the same way and perhaps have different levels of pain intensity as well.

Melzack, et al. (1987) reported the pain intensity (M = 2.5 in a group without complications; M = 3.3 in a group with complications) of 88 patients with a wide variety of surgeries (>11) , but only four patients had back surgeries and there were no reported total joint arthroplasties. Fortin, Schwartz-Barcott, and Rossi (1992) also described postoperative pain, but their sample included 246 cholecystectomy patients. They found moderate sensory pain intensity scores (M = 12.30, SD = 6.55 on a scale of 0-42) on the third postoperative day. Both of these studies used the MPQ. Other studies have described postoperative pain in gynecological laparotomy patients using the Finnish Pain Questionnaire which measures multidimensional pain similar to the MPQ (Ketovuori, 1987), and in cholecystectomy patients using the MPQ and Visual Analog Scale (Taenzer, 1983). Studies describing the multidimensional postoperative pain experience with orthopedic populations are scarce in the literature.

Sriwatanakul et al. (1983) studied postoperative pain in a surgical orthopedic population. However, they only recorded pain

intensity and pain relief by interview and observation. Their sample included 28 lumbar laminectomy, 9 hip arthroplasty, and 5 "other major orthopedic" patients. They found 72 hours postoperatively that 91% of the patients reported pain of sufficient intensity to disturb their eating, talking, concentration, and mainly their sleeping and ambulation. This study suggests considerable unrelieved pain up to three days postoperatively in these major orthopedic surgery populations. Sriwatanakul et al. recommend that postoperative pain be assessed often and the effects of analgesics should be monitored carefully, as not all patients respond to analgesics in the same manner.

An extensive literature search was completed, and with the exception of the Giuffre, Asci, Arnstein, and Wilkinson (1991) study, no literature was found describing the multidimensional postoperative pain experience in THA or TKA patients. No study was found that described the multidimensional postoperative pain experience of the MLD patient. Giuffre et al. used the Short-Form McGill Pain Questionnaire (SF-MPQ) to describe postoperative pain in THA and TKA patients and found primarily sensory word descriptors used. The majority of patients described their pain as moderate to severe, aching and heavy. Very few affective words were selected. Patients with TKA indicated higher pain intensity scores (M = 7.7) than patients with THA (M = 4.7) using the Visual Analog Scale (VAS). However, their sample was small (N = 29) and they suggest additional research be done with a larger population. No other studies were found that describe the postoperative pain experience in these patient populations.

There are few pain assessment tools available that measure the multidimensional aspects of pain as well as the intensity of pain (McGuire, 1984). This study utilized the multidimensional MPQ designed for practical use in the clinical area (Melzack, 1975). A multidimensional assessment of postoperative pain may provide better

understanding of postoperative pain enabling more effective evaluation and management of postoperative pain.

Factors Predicting Postoperative Pain

Pain perception and evaluation may be influenced by factors such as cultural or racial expectations, personality, past experiences with pain, emotions, or anxiety (Melzack & Wall, 1965), type of anesthesia (Giuffre et al., 1991), and pain tolerance (McCaffery & Beebe, 1989). Certain cultural values and beliefs may cause a patient to react to pain according to its significance, or by learned behaviors. Individuals who are highly motivated and possess high self-esteem experience less pain and are managed better than individuals who are less motivated and possess low-self esteem and dependent behaviors. Individuals with high levels of anxiety, or who are angry or aggressive, tend to require more analgesia for effective pain relief (Preble, Guveyan, & Sinatra, 1992). Giuffre et al. reported that patients receiving general anesthesia had less pain and required less postoperative analgesia than patients receiving spinal anesthesia in postoperative joint replacements (hips and knees). Pain tolerance is a unique individual response which varies between individuals and from one situation to another in the same individual. When tolerance is high, less pain is experienced and less analgesic is required. The opposite occurs with low tolerance levels (McCaffery & Beebe, 1989).

Other factors that may influence pain perception include age, gender, the nature and length of the surgery, body size, history of substance abuse or opioid tolerance, and method of analgesic administration (Preble et al., 1992). It has been reported that the elderly experience better pain relief, requiring less medication, with longer duration than younger individuals, but research is inconclusive. Pain is very individual, and care must be taken not to generalize treatment of pain in the elderly. Gender-related differences have also been conflicting in research. The type of surgery, degree of

manipulation, and duration of surgery may dramatically affect pain intensity and analgesic requirements. Body size does not appear to influence pain intensity or analgesic requirements. History of substance abuse or opioid tolerance does not appear to affect the level of pain as much, but increases the amount of analgesia required (Preble et al., 1992). The method of analgesic delivery may influence pain intensity as well as analgesic requirements. Patients receiving scheduled analgesics versus "as needed" analgesics report better pain control (Acute Pain Management Guideline Panel, 1992). Patients receiving patient-controlled analgesia (PCA), intrathecal, epidural, or interpleural analgesia have reported better pain control using less analgesia than conventional "as needed" analgesic therapies (Preble et al., 1992).

Theoretical Framework

Pain is a complex multidimensional experience involving various physiological, psychological, emotional, and behavioral aspects. Generally pain has been viewed as involving three components: a cognitive-evaluative component, a sensory-discriminative component, and an affective-motivational component (Feuerstein, 1989; Lowe, Walker & MacCallum, 1991; Melzack & Katz, 1992; Turk & Rudy, 1989). The cognitive-evaluative component involves evaluating the pain experience and responding to it on the basis of memories of past experiences, conditioned responses, cultural preferences, gender roles, and learned behaviors. The sensory-discriminative component involves the sensing of pain through sensory pathways of the nervous system which is then perceived in the brain as being painful. The affective-motivational component of pain involves the emotional and behavioral aspects of the pain experience that are mediated through the limbic system, reticular activating system, and the brainstem. The integration of these three components make up a total pain experience (Boss, 1987; Ludwig-Beymer, Huether & Schoessler, 1994).

Gate Control Theory

This multidimensional approach to pain is based on the gate control theory of pain which was first proposed by Melzack and Wall in 1965 (Melzack & Torgerson, 1971; Melzack & Wall, 1965, 1970). This theory has been influential in understanding the multidimensional phenomena involved in the perception of pain (Donovan, 1990). According to this theory, pain is not a function of any one system, but results from the interaction between the sensory-discriminative, motivational-affective, central control processes, motor mechanisms, and a gating mechanism. The gating mechanism, located in the spinal cord, facilitates or inhibits the transmission of nerve impulses from peripheral nociceptors to the brain (Melzack, 1975; Melzack & Torgerson, 1971; Melzack & Wall, 1965, 1970).

Painful stimuli cause the release of numerous chemical mediators such as bradykinin, acetylcholine, dopamine, histamine, serotonin, substance P, and prostaglandins, which depolarize peripheral neurons propagating impulses both centrally and locally. These nociceptive afferent impulses travel along small, fast, myelinated A-delta fibers; larger, fast, heavily myelinated A-beta fibers; and large, slower unmyelinated C-fibers that synapse in the dorsal horn of the spinal cord with the substantia gelatinosa (SG) (Donovan, 1990). The majority of the pain impulses travel through the C-fibers and are characterized as a dull, burning, and aching diffuse sensation. Pain impulses transmitted by the A-delta fibers are characterized as a sharp, stabbing, readily located sensation (Zimmermann, 1981). The fast A-beta fiber impulses reach the SG first and cause the release of inhibitors that block or diminish the transmission of the remaining peripheral impulses at the SG (Donovan, 1990).

The A-beta fibers also send impulses directly to the brain stem, the thalamus, and the sensory cortex through the dorsal column-medial lemniscus fibers and the dorso-lateral fibers. This activates a central

control triggering mechanism that exerts control over the sensory input and activates the action system which is responsible for perception and triggering a response (Melzack & Wall, 1965). The cells of the SG in the spinal cord collect and combine the afferent peripheral impulses with the efferent impulses descending from the cortex. If nociceptive impulses exceed modulating and blocking impulses, the gate opens and impulses are transmitted through central transmission cells (T-cells), in the dorsal horn, up the ascending tracts to the medulla, midbrain, and cortex. If the modulating and blocking impulses exceed the nociceptive impulses, the gate is blocked and transmission is stopped or diminished up the cord (Donovan, 1990; Melzack & Wall, 1965).

The central biasing mechanism located in the brain stem can inhibit the gating mechanism through sufficient auditory, visual, or other sensory stimuli. The central control mechanism located in the thalamus and the cerebral cortex also regulates the gate control through past experiences, emotions, attention, suggestion, anxiety, anticipation, cultural expectations, and other factors by regulating the sensory input that reaches the brain (Boss, 1987; Melzack & Wall, 1965). It is suggested that through these gate-control mechanisms the individual's own unique pain history, state of mind, and personal meaning of what constitutes a painful situation can greatly influence the reaction to pain along with the individual's perception to pain (Boss, 1987).

The gate control theory seems to indicate there is no predictable relationship between a painful stimulus and the perception of the stimulus. Individuals differ in the amount of endogenous response to painful stimuli. Therefore, since no individuals are exactly alike with exactly the same experiences, individuals should not be expected to respond in the same way to the same painful stimulus. Neither should individuals be expected to require the same amount of medication for effective pain relief (McCaffery & Beebe, 1989). The Gate Control

Theory provides the framework for this study because it supports the multidimensional and subjective nature of pain.

Chapter 3

Methods

Setting

This prospective descriptive study was conducted at a 485-bed metropolitan hospital in the midwest on an orthopedic/neurosurgery unit, concurrent with two other related studies. Approval was obtained from the medical center Institutional Review Board (IRB, see Appendix A), and the research facility's Research Committee and Medical Review Board. A historical assessment was completed on the number of surgeries (THA, TKA, & MLD) performed at the research facility. From July 1993, to December 1993, the research facility performed 47 THA, 100 TKA, and 146 MLD surgeries, or a total of 293 of the surgeries involved in this study.

Subjects

A power analysis was completed to establish the number of subjects required to produce a power of 0.80 with a significance level of 0.05 and a medium effect size. Using a multiple regression model with seven predictor variables, a sample of 150 subjects produced a medium effect power of 1.00 and a small effect power of 0.85. A total of 139 subjects were approached to enter the study. Nineteen subjects (14%) declined to enter the study, and two (1%) were felt to be unreliable sources of information secondary to confusion. Of the 118 subjects (85% acceptance rate) who entered the study, 12 (10%) were withdrawn. Reasons for withdrawal included: surgery canceled (n = 4, 3%), complications secondary to an ileus (n = 1, 1%), postoperative confusion (n = 2, 2%), narcan received in recovery (n = 3, 3%), and prolonged atypical postoperative course (n = 2, 2%). A total sample size of 106 subjects (90% of subjects that entered) remained for whom data were collected and entered into the final analyses. A convenience sample was necessary in order to obtain a sufficient sample size during the short data

collection period. The 106 subjects comprised the following surgical groups: 41 MLDs (39%), 21 THAs (20%), and 44 TKAs (42%).

All subjects scheduled for THA, TKA, and MLD procedures were invited to participate in the study if they met the following inclusion criteria: able to speak and read English; alert and oriented to person, place, and time; 19 years of age or older; no history of drug abuse; no allergies to narcotics; no chronic diseases that limited the use of opiates, did not receive narcan postoperatively; and absence of any major psychiatric disorders.

Since no intervention was utilized in this study, there were no discernable risks to the participants. All subjects received the routine pre-, intra-, and postoperative analgesia ordered by their physicians. Analgesia orders at the research facility included opioids administered by patient controlled analgesia (PCA), intravenously (IV), intramuscularly (IM), or orally; and non-steroidal anti-inflammatory drugs (NSAIDs). Standardized intraoperative anesthesia was not employed.

Instruments

Providing patients with a pain rating scale gives the patient a common language to effectively communicate their pain to members of the health care team. It also conveys to the patient that pain control is important. Pain rating scales are simple to use and are easily understood (Ferrell, Rhiner & Rivera, 1993). The measurement of pain is essential to adequately evaluate interventions used to control pain. An important concern is not the pain itself, but the patient's response to pain, which is mainly subjective in nature. In addition, for effective interventions to occur, the individual's response to pain, or an accurate description of the pain experience, must be addressed (Camp & O'Sullivan, 1987; Davis, 1989). Cohen (1980) found that a single general question concerning postoperative pain is inadequate for pain assessment. Furthermore, McGuire (1984) states tools that measure the

multiple dimensions of pain provide more complete measurements of the pain experience. Therefore, this study measured the single dimension of pain intensity using the Numeric Rating Scale (NRS), as well as the multiple aspects of pain using the McGill Pain Questionnaire (MPQ).

Recent studies in the area of memory for pain produced by invasive procedures reveals that retrospective evaluations of pain are strongly associated with remembering peak intensity levels as well as the level of pain at the end of the procedure. Therefore, it is important to measure pain as it is occurring rather than rely on the memory of past pain (Redelmeier & Kahneman, 1992). In this study, both the NRS and the MPQ were used to measure current pain for all subjects at each measurement.

Numerical Rating Scale (NRS). The NRS is an easy to use, easy to score, self report measure of pain (see Appendix B). The NRS measures only the single dimension of pain intensity on a continuum and consists of a 10-cm baseline marked in equal intervals from 0 representing no pain to 10 representing worst possible pain. It is useful in measuring any type of clinical pain intensity in relation to a therapeutic measure (McGuire, 1984). The AHCPR guidelines (1992) state the NRS is one of the more common self-report pain assessment tools used to assess pain intensity and the level of affective distress in adults.

Stability of the NRS was reported by Ferraz et al., (1990). They reported high reliability of the NRS with repeated administration to literate (n = 66, r = 0.96, p < 0.001) as well as illiterate (n = 25, r = 0.95, p < 0.001) rheumatoid arthritis patients. Downie et al., (1978) in their study on 100 rheumatological patients, reported high correlation coefficients between the NRS and the Visual Analog Scale (VAS, r = 0.83 - 0.995, significance level not reported) and the Simple Descriptive Scale (SDS, r = 0.74 - 0.96, significance level not reported) indicating concurrent validity. Their factor analysis gave one pain intensity factor (other factors considered not reported) with a

loading of 0.998 for the NRS, supporting construct validity. Kremer, Atkinson, and Ignelzi (1981) also reported high correlation (r = 0.86, p < 0.05) between the NRS and the VAS. Furthermore, they reported the NRS as more sensitive to change than the VAS. Strong, Ashton, and Chant (1991) compared eight pain intensity scales on 92 chronic low back pain patients. Their factor analysis also gave one single factor of pain intensity for the NRS with a loading of 0.90. They reported the NRS as the preferred measure of pain intensity in patients with chronic low back pain and rheumatologic disorders. The AHCPR guidelines state the NRS is a reliable and valid tool if the end point descriptors are selected carefully (Acute Pain Management Guideline Panel, 1992).

Previous studies have indicated that the NRS is easier for the patient to comprehend and complete and is less abstract than the VAS (Kremer et al., 1981; McGuire, 1984). The NRS provides a quantifiable way to evaluate the qualitative nature of pain. The NRS also allows for consistent interpretation and communication of the pain intensity between the nurse and the patient, and between the nurse and other health care members. The NRS gives a clear understanding of the level of pain intensity which can facilitate knowledgeable pain interventions (McCaffery & Beebe, 1989). Several authors have reported the NRS to be the most effective scale for measuring acute postoperative pain intensity (Balfour, 1989; Gooch, 1989; Scott, 1992).

Because of the above reasons, the NRS was selected to measure pain intensity in this study. The NRS can be completed in seconds and the pain intensity number selected represents the pain intensity score. The AHCPR guidelines suggest pain intensity ratings be obtained a regular, frequent intervals (Acute Pain Management Guideline Panel, 1992).

McGill Pain Questionnaire (MPQ). Melzack (1975) developed the MPQ which has been useful for rating and measuring clinical pain (see Appendix B). The MPQ is a multidimensional instrument with four major parts. Part 1 consists of 78 descriptive words with 20 subclasses of

words which are scaled on an intensity dimension and categorized within four major dimensions of pain quality--**sensory, affective, evaluative,** and **miscellaneous.** These descriptor words describe the temporal properties of pain. The **sensory** word descriptors (subclasses 1-10, consisting of 42 words) refer to pain in terms of temporal, spatial, thermal and pressure properties. The **affective** word descriptors (subclasses 11-15, including 14 words) refer to pain in terms of tension, fear, punishment, and autonomic functions. The **evaluative** word descriptors (subclass 16, including five words) refer to the subjective overall intensity of the total pain experience (Murrin & Rosen, 1985; Melzack, 1975). The **miscellaneous** word descriptors (subclasses 17-20, including 14 words) refer to miscellaneous qualities of pain. The four descriptor subclasses have individual ratings as well as a total Pain Rating Index (PRI) score. Part 2 consists of a Present Pain Intensity (PPI) item which asks patients to rate their overall present pain intensity on a scale of 0 to 5, with 0 representing no pain and 5 indicating excruciating pain. Part 3 consists of a front and back view drawing of the body, and patients are asked to mark or shade in the area(s) where they are having pain. This indicates the spatial distribution of pain. Part 4 allows the patient to indicate whether they have specific accompanying symptoms such as nausea, headache, dizziness, constipation, diarrhea, or other symptoms indicated. Patients are also asked to rate their sleep patterns, food intake, and activity levels from a list of three to four descriptors. Only Part 1 was used in this study.

The major indices obtained from the MPQ are: Pain Rating Index (PRI); Number of Words Chosen (NWC); and PPI. The PRI is perhaps the most well known and most frequently used instrument to measure clinical pain (Lowe et al., 1991). The PRI score is obtained by adding the rank values from each subclass (PRIS - range 0-42 , PRIA - range 0-14, PRIE - range 0-5, & PRIM - range 0-17) and a total score of all the subclass scores (PRIT - range 0-78). The NWC is determined by adding the number

of descriptors indicated in each subclass and category (range 0-20). The PPI descriptor selected has a numerical value assigned which determines its score (0-5). The PPI indicates the patient's overall present pain intensity rating.

Investigators have validated the factor structure (sensory, affective, and evaluative) components of the MPQ (Burckhardt, 1984; Byrne et al., 1982; Lowe et al., 1991; Prieto et al., 1980; Reading, 1982; Turk, Rudy, & Salovey, 1985). Kremer & Atkinson (1981) supported construct validity of the affective component of the MPQ in a study of patients with chronic benign pain. Patients with higher affective scores on the MPQ had significantly higher depression and anxiety scores on the Brief Symptom Inventory. Construct validity was also reported by Turk et al., (1985). Graham, Bond, Geekovich, and Cook (1980) evaluated the test-retest reliability and consistency of the MPQ in two groups of cancer patients ($\underline{N}$ = 36 and $\underline{N}$ = 16) and reported the consistency of pain descriptors ranged from 66% to 80% over four weekly administrations. Melzack (1975) earlier reported similar consistency with an average of 70% over three weekly administrations.

McGuire (1984) states the MPQ is useful in descriptive studies to assess and describe characteristics of pain, evaluate effects of pharmacologic interventions, and to distinguish between different types of pain. Wagstaff et al., (1985) reports the MPQ is sensitive enough to differentiate between closely related arthritic pain conditions. Furthermore, the MPQ can be completed repeatedly by patients with chronic or acute pain to assess the severity of pain and the pain experience in order to appropriately assess the impact of treatment outcomes (Ferrer-Brechner, 1989). Dr Ronald Melzack granted permission to use the MPQ in this study.

Demographic and Postoperative Data. A Patient Interview Demographic Data Form (see Appendix B) and a Chart Demographic Data Form (see Appendix B) were utilized to obtain demographic data from each subject. Information obtained by these forms included: age, sex, race,

religion, marital status, education, occupation, past and present pain experience, diagnosis, anesthesia, height, and weight. A data collection form was utilized to collect the following information daily: pain intensity (NRS) ratings, pain description (MPQ) scores, and morphine equivalents for every four hour and 24 hour periods (see Appendix B).

A Pain History and Assessment Form (see Appendix B) was also completed with the preoperative MPQ. This form assessed the patient's previous pain history and characteristics of their pain. The Other Factors Associated With Pain Form (see Appendix B) assessed how the patient's pain affected their sleep, appetite, physical activity, and mood. These four factors (sleep, appetite, physical activity, and mood) were assessed each time the MPQ was administered in this study to determine how postoperative pain affects these specific factors. Patients ranked the interference of pain in these four areas on a scale of 0-10 similar to the NRS with 0 equal to no interference, and 10 equal to complete interference. The actual rating in these four areas becomes the score.

Procedure

1. Prior to data collection, the three research nurses were trained in the use of the specific tools and the specific data collection procedures to be used in all three studies. All three nurses participated in patient instruction and data collection for this study and the other two concurrent studies.

2. Training sessions were conducted for nurses on the orthopedic/neurosurgery unit used in this study. This training session included a complete description of the purpose and nature of the study as well as a complete description of the NRS and its proper use in data collection. The NRS was already being used by the research facility. The Pain Assessment Documentation Form (see Appendix B), for documenting the every four hour NRS values, was explained. The every four hour NRS values were the only values the nursing staff were asked to collect.

The expectations of the researchers concerning complete and accurate data collection was stressed.

3. The surgery schedule was reviewed daily by a research nurse for scheduled THA, TKA, and MLD procedures. The majority of the subjects were contacted in the PREP (Preoperative Registration & Education Program) department prior to surgery. Those not participating in the PREP program were contacted as inpatients the day before surgery or in AM admissions on the morning of surgery. A research nurse reviewed the chart of each patient scheduled for any of these procedures to determine if the patient met the inclusion criteria.

4. Subjects meeting the inclusion criteria were invited to participate in this study after a thorough explanation of the study was given by a research nurse. Subjects were assured that their participation in the study was completely voluntary and that all data obtained would be kept confidential. Participants were informed that they could withdraw from the study at any time without prejudicing their relationship with the research facility.

5. If the subject consented, the subject was enrolled into the study and a written informed consent form was obtained (see Appendix B). If the subject declined, the subject was thanked for his or her time and consideration, and was assured that no repercussions would result from their decision. All patients received the same routine care provided by the research facility regardless of their participation in this study.

6. After the subjects were enrolled, a research nurse completed the Patient Interview Demographic Data Form and a baseline pain intensity and pain description score was obtained using the NRS and the MPQ respectively. The Pain History and Assessment Form, and the Other Factors Associated With Pain Form were also completed at this time, or as soon as possible.

7. The Chart Demographic Data Form was completed pre- and postoperatively by a research nurse.

8. The trained staff nurses initiated pain assessment ratings using the NRS postoperatively when the patient returned from surgery, with subsequent assessments placed on a four hour interval schedule of 8 AM, noon, 4 PM, 8 PM, etc. for the first four postoperative days. On the fourth postoperative day at midnight, pain assessments using the NRS were changed to every eight hours (8 AM, 4 PM, midnight) throughout the remaining hospital stay. The NRS ratings were recorded on the Pain Assessment Documentation Form.

9. The MPQ was administered by a research nurse at approximately the same time (4 PM), to control for circadian rhythm effects on postoperative day 1, and every day throughout the remaining hospital stay (except the day of discharge). Participants were instructed to verbally select only one word that best described their present pain, if applicable, from each of the 20 groups of descriptors. A research nurse then recorded the descriptors selected on the MPQ. The patient also was asked how their pain affected their sleep, appetite, physical activity, and mood on the same schedule (recorded on the Other Factors Associated With Pain Form).

10. The total dose, time, and route of analgesic administered, recorded on the Pain Assessment Documentation Form, were collected by a research nurse. All analgesic medication and the respective doses were converted to equianalgesic morphine equivalents (mg/kg body wt) for each four hour period for the entire hospital stay. A total equianalgesic dose was also calculated for each day.

Data Analysis

Data analyses were in the aggregate and participant names were not disclosed. A code book was formulated to assist in data analysis. Data from the collection instruments were entered into a computer by the research nurses using Epi Info 6.0 software and was verified for accurate input. Statistical analyses were completed using the Statistical Analysis System (SAS) software. The level of significance chosen was $p < 0.05$.

Research Aim 1: To describe postoperative pain over time for patients undergoing total hip arthroplasty (THA), total knee arthroplasty (TKA), or microlumbar discectomy (MLD). Descriptive statistics (means, standard deviations, standard error of the means, and/or frequency distributions, and percentages) were applied to the NRS pain ratings, the MPQ pain assessment data, and the amount of analgesia received to describe the pain pattern. Graphs were created to display the mean four hour NRS pain ratings and the time periods were collapsed into clinically meaningful time periods (every 12 hours from 8 AM - 8 PM & 8 PM - 8 AM). For purposes of describing postoperative pain, the total sample size was broken down into the three respective surgical groups (MLD, THA, & TKA) and described separately.

Research Aim 2: To identify specific patient characteristics and demographic factors that predict postoperative pain scores in patients undergoing total hip arthroplasty (THA), total knee arthroplasty (TKA), or microlumbar discectomy (MLD). T-tests, and analysis of variance (ANOVA) were used to determine significant differences between categorical variables. Correlations were used to determine significant relationships between continuous variables. Significant results from these tests and the demographic interview and chart data of patient characteristics determined which factors would be included in the regression. Stepwise multiple regressions were used to determine which factors predict pain over time. For purposes of performing the regressions, the MLD patients were examined separately due to their shorter length of stay and differences in demographic variables; the THA and TKA patients were combined for greater power as they had very similar demographic variables.

Chapter 4

Manuscript for Publication

Running head: POSTOPERATIVE PAIN PREDICTORS

Pain Predictors in Selected Postoperative Patients

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Abstract

This descriptive study described postoperative pain for 106 patients in a midwestern metropolitan hospital undergoing total hip arthroplasty (THA, *n* = 21), total knee arthroplasty (TKA, *n* = 44), or microlumbar discectomy (MLD, *n* = 41); and ascertained factors that predicted postoperative pain. Postoperative pain was assessed using the McGill Pain Questionnaire (MPQ) and a "0" to "10" Numeric Rating Scale (NRS). Postoperative pain was described as most intense during the first 28 hours following surgery (MLD *M* = 4.0, THA *M* = 3.1, TKA *M* = 4.3), and intermittently throughout the first 3 postoperative days during periods of decreased pain medications. Preceding pain intensity ratings were the strongest predictors of subsequent postoperative pain intensity ratings (*Beta* = .29 to .70). This study indicates more attention should be focused on preceding pain intensity ratings and more adequate analgesia in the immediate postoperative period.

Pain Predictors in Selected Postoperative Patients

Acute postoperative pain is an unpleasant multidimensional subjective experience (Acute Pain Management Guideline Panel, 1992; Donovan, 1990; Huskisson, 1974; Marks & Sachar, 1973; McCaffery & Beebe, 1989; Walding, 1991) in which effective management remains a challenge. Effective management of postoperative pain can be an important determinant in overall patient recovery. Recent guidelines established by the Agency for Health Care Policy and Research (AHCPR) suggest evaluation studies be performed to determine the effectiveness of pain assessment and management procedures. Recent literature has focused on evaluative studies; however, a paucity of literature exits describing the postoperative pain experience of patients undergoing total hip arthroplasty (THA), total knee arthroplasty (TKA), or microlumbar discectomy (MLD) surgery, and the specific factors predicting pain. There is a need for studies utilizing systematic pain assessment. Studies by Donovan and her colleagues (1990) have consistently shown that systematic assessments of pain are rare in hospital settings. Donovan, Dillon, and McGuire (1987) recommend studies that identify the factors contributing to pain in medical-surgical patients. Therefore, this study utilized a systematic assessment to describe and predict postoperative pain.

Literature Review

Numerous studies have revealed the inadequate assessment and treatment of postoperative pain (Cohen, 1980; Donovan, Dillon & McGuire, 1987; Edwards, 1990; Marks & Sachar, 1973; Melzack, Abbott, Zackon, Mulder & Davis, 1987; Sriwatanakul et al., 1983). These studies have revealed that 31-75% of postoperative patients suffered unrelieved moderate to severe postoperative pain. According to the AHCPR guidelines, the most reliable source of the existence and intensity of pain is the patient's self-report (Acute Pain Management Guideline Panel, 1992). There have been few studies that have examined the patient's description of postoperative pain. Melzack, et al. (1987)

reported the pain intensity (M = 2.5 in a group without complications; M = 3.3 in a group with complications) of 88 patients with a wide variety of surgeries (>11). Fortin, Schwartz-Barcott, and Rossi (1992) found moderate sensory pain intensity scores (M = 12.30, SD = 6.55 on a scale of 0-42) on the third postoperative day. Other studies have described postoperative pain in gynecological laparotomy patients using the Finnish Pain Questionnaire which measures multidimensional pain similar to the MPQ (Ketovuori, 1987), and in cholecystectomy patients using the MPQ and Visual Analog Scale (Taenzer, 1983).

Studies describing the multidimensional postoperative pain experience with orthopedic populations are scarce in the literature. Sriwatanakul et al. (1983) studied postoperative pain in a surgical orthopedic population. They found 72 hours postoperatively that 91% of the patients reported pain of sufficient intensity to disturb their eating, talking, concentration, and mainly their sleeping and ambulation. This study suggests considerable unrelieved pain up to three days postoperatively.

An extensive literature search was completed, and with the exception of the studies by Giuffre, Asci, Arnstein, and Wilkinson (1991), and Crutchfield, Zimmerman, Nieveen, Barnason, and Pozehl (in press), no literature was found describing the multidimensional postoperative pain experience in THA or TKA patients. No study was found that described the multidimensional postoperative pain experience of the MLD patient. Giuffre et al. reported patients with TKA indicated higher pain intensity scores (M = 7.7) than patients with THA (M = 4.7). Crutchfield et al. reported higher sensory pain descriptors from the MPQ and higher pain intensity ratings, using the Present Pain Intensity (PPI) scale, in the immediate postoperative period for 120 TKA patients. No other studies were found that describe the postoperative pain experience in these patient populations.

Pain perception and evaluation may be influenced by factors such as cultural or racial expectations, personality, past experiences with

pain, emotions, or anxiety (Melzack & Wall, 1965), type of anesthesia (Giuffre et al., 1991), and pain tolerance (McCaffery & Beebe, 1989). Certain cultural values and beliefs may cause a patient to react to pain according to its significance, or by learned behaviors. Individuals with high levels of anxiety, or who are angry or aggressive, tend to require more analgesia for effective pain relief (Preble, Guveyan & Sinatra, 1992). Giuffre et al. reported that patients receiving general anesthesia had less pain and required less postoperative analgesia than patients receiving spinal anesthesia. Pain tolerance is a unique individual response which varies between individuals and from one situation to another in the same individual. When tolerance is high, less pain is experienced and less analgesic is required. The opposite occurs with low tolerance levels (McCaffery & Beebe, 1989).

Other factors that may influence pain perception include age, gender, the nature and length of the surgery, body size, history of substance abuse or opioid tolerance, and method of analgesic administration (Preble et al., 1992). It has been reported that the elderly experience better pain relief, requiring less medication, with longer duration than younger individuals, but research is inconclusive. Gender-related differences have also been conflicting in research. The method of analgesic delivery may influence pain intensity as well as analgesic requirements. Patients receiving scheduled analgesics versus "as needed" analgesics report better pain control (Acute Pain Management Guideline Panel, 1992).

Literature is scarce that describes the multidimensional postoperative pain experience as well as the specific factors predicting postoperative pain in the MLD, THA, and TKA patients. This study will hopefully lend information needed to narrow this gap in the literature.

Theoretical Framework

Components of the Gate Control Theory have been influential in understanding the multidimensional phenomena involved in the perception of pain (Donovan, 1990). According to this theory, pain is not a

function of any one system, but results from the interaction between the sensory-discriminative, motivational-affective and central control processes, motor mechanisms, and a gating mechanism. The gating mechanism facilitates or inhibits the transmission of nerve impulses to the brain (Melzack, 1975; Melzack & Torgerson, 1971; Melzack & Wall, 1965, 1970). The gating mechanism combines the afferent peripheral impulses with the efferent impulses descending from the cortex. If nociceptive impulses exceed modulating and blocking impulses, the gate opens, and impulses are transmitted to the medulla, midbrain, and cortex. If the modulating and blocking impulses exceed the nociceptive impulses, the gate is blocked, and transmission is stopped or diminished up the cord (Donovan, 1990; Melzack & Wall, 1965). The gating mechanism can be inhibited through sufficient auditory, visual, or other sensory stimuli and is regulated by past experiences, emotions, attention, suggestion, anxiety, anticipation, cultural expectations, and other factors (Melzack & Wall, 1965). It is suggested that through these gate-control mechanisms the individual's own unique pain history, state of mind, and personal meaning of what constitutes a painful situation can greatly influence the reaction to pain along with the individual's perception to pain (Boss, 1987).

Methods

Design and Setting

This prospective descriptive study was conducted at a metropolitan hospital in the midwest on an orthopedic/neurosurgery unit. Institutional Review Board (IRB) approval was obtained.

Sample

The non-probability convenience sample 106 subjects comprised the following surgical groups: 21 THAs (20%), 44 TKAs (42%), and 41 MLDs (39%). All subjects were invited to participate in the study if they met the following inclusion criteria: able to speak and read English; alert and oriented to person, place, and time; 19 years of age or older; no history of drug abuse; no allergies to narcotics; no chronic diseases

that limited the use of opiates; did not receive narcan postoperatively; and absence of any major psychiatric disorders. All subjects received the routine pre-, intra-, and postoperative analgesia ordered by their physicians. The majority of the sample were female (n = 63, 59%), caucasian (n = 104, 98%), protestant (n = 63, 59%), married (n = 75, 71%), and employed in technical occupations (n = 49, 46%). The mean age of the total sample was 58.8 (SD = 16.7) years with a range of 24 to 87 years. See Tables 1 and 2 for sample characteristics.

Insert Table 1 & 2 about here

Surgical Groups. There were differences between the three surgical groups in several demographic variables (see Table 3). Most of the differences were between the MLD group and the total joint groups. MLD patients were younger, were in more technical occupations, had shorter duration of preoperative pain, and had shorter lengths of stay than the total joint groups. The only demographic variable that differed between the total joint group was sex. There were more males (n = 13, 62%) than females (n = 8, 38%) in the THA group than either the MLD or TKA groups.

Insert Table 3 about here

Instruments

Numerical Rating Scale (NRS). The NRS is an easy to use, easy to score, self report measure of pain. The NRS measures only the single dimension of pain intensity on a continuum consisting of a 10-cm baseline marked in equal intervals from 0 representing no pain to 10 representing worst possible pain. The NRS can be completed in seconds and the pain intensity number selected represents the pain intensity score. The AHCPR guidelines state the NRS is a reliable and valid tool

if the end point descriptors are selected carefully (Acute Pain Management Guideline Panel, 1992).

Ferraz et al., (1990) reported high reliability and stability of the NRS with repeated administration to literate (n = 66, r = 0.96, p < 0.001) as well as illiterate (n = 25, r = 0.95, p < 0.001) rheumatoid arthritis patients. Downie et al., (1978), in their study of 100 rheumatological patients, reported high correlation coefficients between the NRS and the Visual Analog Scale (VAS, r = 0.83 - 0.995) and the Simple Descriptive Scale (r = 0.74 - 0.96) indicating concurrent validity. Their factor analysis gave one pain intensity factor with a loading of 0.998 for the NRS, supporting construct validity. Kremer, Atkinson, and Ignelzi (1981) also reported high correlation (r = 0.86, p <0.05) between the NRS and the VAS and reported the NRS as more sensitive to change than the VAS. Strong, Ashton, and Chant (1991) compared eight pain intensity scales on 92 chronic low back pain patients. Their factor analysis also gave one single factor of pain intensity for the NRS with a loading of 0.90. They reported the NRS as the preferred measure of pain intensity in patients with chronic low back pain and rheumatologic disorders.

McGill Pain Questionnaire (MPQ). The MPQ, developed by Melzack (1975), is a multidimensional instrument with four major parts. Only Part 1 was used in this study which consists of 78 descriptive words in 20 subclasses which are scaled on an intensity dimension and categorized within four major dimensions of pain quality--**sensory**, **affective**, **evaluative**, and **miscellaneous**. The 42 **sensory** word descriptors (subclasses 1-10) refer to pain in terms of temporal, spatial, thermal and pressure properties. The 14 **affective** word descriptors (subclasses 11-15) refer to pain in terms of tension, fear, punishment, and autonomic functions. The five **evaluative** word descriptors (subclass 16) refer to the subjective overall intensity of the total pain experience (Murrin & Rosen, 1985; Melzack, 1975). The 14 **miscellaneous** word descriptors (subclasses 17-20) refer to miscellaneous qualities of pain.

The four descriptor subclasses have individual ratings as well as a total Pain Rating Index (PRI) score. The PRI score is obtained by adding the rank values from each subclass (PRIS - range 0-42, PRIA - range 0-14, PRIE - range 0-5, & PRIM - range 0-17) and a total score of all the subclass scores (PRIT - range 0-78).

The factor structure (sensory, affective, and evaluative components) of the MPQ has been validated (Burckhardt, 1984; Byrne et al., 1982; Lowe et al., 1991; Prieto et al., 1980; Reading, 1982; Turk, Rudy, & Salovey, 1985). Kremer & Atkinson (1981) supported construct validity of the affective component of the MPQ in a study of patients with chronic benign pain. Graham, Bond, Geekovich, and Cook (1980) evaluated the test-retest reliability and consistency of the MPQ in two groups of cancer patients (N = 36 and N = 16) and reported the consistency of pain descriptors ranged from 66% to 80% over four weekly administrations. Melzack (1975) also reported similar consistency with an average of 70% over three weekly administrations.

Wagstaff, Smith, and Wood (1985) report the MPQ is sensitive enough to differentiate between closely related arthritic pain conditions. Furthermore, the MPQ can be completed repeatedly by patients with chronic or acute pain to assess the severity of pain and the pain experience in order to appropriately assess the impact of treatment outcomes (Ferrer-Brechner, 1989).

Procedure

Prior to data collection, training sessions were conducted for nurses on the orthopedic/neurosurgery unit used in this study. The surgery schedule was reviewed daily by a research nurse for scheduled THA, TKA, and MLD procedures. A research nurse reviewed the patient's chart to determine patient qualification. Subjects were invited to participate in this study after a thorough explanation of the study, and a written informed consent was obtained.

A research nurse obtained demographic data and a baseline pain intensity and pain description score using the NRS and the MPQ

respectively. A pain history and assessment of factors associated with pain was obtained. Pain intensity ratings using the NRS were initiated when the patient returned from surgery, with subsequent assessments placed on a four hour interval schedule (8 AM, noon, 4 PM, etc.) for the first four postoperative days. On the fourth postoperative day at midnight, pain assessments were changed to every eight hours (8 AM, 4 PM, midnight). The MPQ was administered at approximately the same time (4 PM), to control for circadian rhythm effects, on postoperative day one, and every day throughout the remaining hospital stay except the day of discharge. Participants were instructed to verbally select only one word that best described their present pain, if applicable, from each of the 20 subclasses of descriptors. The total dose, time, and route of analgesic administered was collected and the respective doses were converted to equianalgesic morphine equivalents (total mg/kg of body wt) for each four hour period.

Analyses

Data from the collection instruments were entered into a computer using Epi Info 6.0 software and was verified for accurate input. Statistical analyses were completed using the Statistical Analysis System (SAS) software. The level of significance chosen was $p < 0.05$.

Research Aim 1: To describe postoperative pain over time for patients undergoing total hip arthroplasty (THA), total knee arthroplasty (TKA), or microlumbar discectomy (MLD). Descriptive statistics (means, standard deviations, standard error of the means, and/or frequency distributions, and percentages) were employed.

Research Aim 2: To identify specific patient characteristics and demographic factors that predict postoperative pain scores in patients undergoing total hip arthroplasty (THA), total knee arthroplasty (TKA), or microlumbar discectomy (MLD). The mean four hour NRS time periods were collapsed into clinically meaningful time periods (every 12 hours from 8 AM to 8 PM & 8 PM to 8 AM). T-tests and analysis of variance (ANOVA) were used to determine significant differences between

categorical variables. Correlations were used to determine significant relationships between continuous variables. Significant results from these tests determined which variables entered the regression model. Stepwise multiple regressions were used to determine which factors predicted pain for each of the selected time periods. For purposes of performing the regressions, the MLD patients were examined separately due to their shorter length of stay and differences in demographic variables; the THA and TKA patients were combined for greater power in the analyses.

Results

Postoperative Pain Description

Microlumbar Discectomy (MLD). Figure 1 compares the mean NRS pain intensity ratings with each preceding four hour mean pain medication dosage (total morphine equivalents in mg/4 hour period). The highest mean pain intensity rating (M = 4.0, SD = 2.4) occurred at 8 PM on the day of surgery (OR day). Pain medication decreased during the preceding four hours and continued to decrease during the four hours following this moderate level of pain. The mean pain intensity rating remained around this level (M = 3.5 - 4.0) from 8 PM, OR day until 8 AM, postoperative day one (POD 1) while pain medication dosages continued to decrease. The mean pain intensity level didn't reach its lowest level (M = 2.2, SD = 2.3) until midnight on POD 1. The mean pain intensity peaked again at 4 AM on POD 2 (M = 3.2, SD = 2.5). Again, pain medication decreased the four hours preceding this rating. The maximum pain intensity recorded by any patient (a "10") occurred at noon, 4 PM, and 8 PM on OR day. Mean postoperative pain intensity ratings exceeded the mean acceptable level of pain (M = 3.5, SD = 1.9) four times, all occurring within the first 24 hours after surgery.

Insert Figure 1 about here

Total Hip Arthroplasty (THA). Mean NRS pain intensity ratings are compared with mean pain medication doses for each preceding four hour postoperative time interval in Figure 2. Contrary to MLD patients, THA patients had their highest postoperative pain intensity rating at 4 PM on POD 1 (M = 3.0, SD = 2.2). A pattern became evident as pain intensity peaked from noon to 4 PM on POD 1, POD 2, and POD 3 while pain medication decreased for each preceding four hour period. Pain intensity ratings decreased during the succeeding four hour time periods as pain medication dosages increased. Pain was controlled better at night than for the MLD patients with the exception of from 8 PM on POD 2 to 4 AM on POD 3. Contrary to MLD patients, there were no maximum pain intensity ratings of "10" reported by any patient postoperatively. Mean postoperative pain intensity ratings exceeded mean acceptable levels of pain (M = 2.8, SD = 2.3) only twice (noon, OR day and 4 PM, POD 1), again all within the first 28 hours of surgery.

Insert Figure 2 about here

Total Knee Arthroplasty (TKA). Mean NRS pain intensity ratings are compared with mean pain medication doses for each preceding four hour postoperative time interval in Figure 3. As pain intensity increased from noon to 8 PM on OR day, pain medication decreased. There were three other times in the first 48 hours postoperatively when pain intensity peaked while preceding pain medications decreased. Similar to MLD patients, but not THA patients, the highest pain intensity rating for the entire postoperative period was also at 8 PM on OR day. Similar to the THA patients, TKA had an increase in mean pain intensity from noon to 4 PM on POD 1 with a preceding decrease in pain medications. However, this trend did not repeat itself on POD 2 or POD 3 as it did with the THA patients. This was probably due to the fact that TKA patients received two to two and a half times more pain medications during these time intervals than THA patients did. Unlike MLD and THA

patients, there were many maximum pain intensity ratings of "10". In addition to the interval from noon to 8 PM on OR day like MLD patients, TKA patients had maximum pain intensity ratings of "10" at 13 other time intervals from 4 AM on POD 1 to 8 AM on POD 5. However, mean postoperative pain intensity ratings exceeded mean acceptable levels of pain (M = 4.0, SD = 2.1) only once at 8 PM on OR day.

Insert Figure 3 about here

MPQ Sensory and Affective Ratings. The MPQ sensory (PRIS) and affective (PRIA) pain ratings are presented in Figures 4 and 5 respectively. The **sensory** and **affective** dimensions of pain have been the most clinically significant in the past as was found in this study. The MLD patients are only represented up to POD 2 as only 25 percent of the patients remained hospitalized after this point. Postoperatively, MLD patients indicated the highest mean **sensory** and **affective** ratings overall. Their mean **sensory** and **affective** scores continued to rise from surgery to discharge. Total knee arthroplasty patients indicated higher **sensory** and **affective** ratings postoperatively than THA patients. This was inversely true preoperatively. While THA patients experienced less **sensory** and **affective** pain postoperatively compared to preoperatively, TKA and MLD patients experienced more **sensory** and **affective** pain postoperatively than preoperatively.

Insert Figures 4 & 5 about here

Factors Predicting Postoperative Pain

Microlumbar Discectomy (MLD). Variables with significant correlation coefficients for the MLD patients to the postoperative pain intensity (NRS) rating intervals were: previous pain intensity ratings (r = .36, p < .05, to r = .63, p < .001), height (r = −.38 to −.43, p < .05), weight (r = −.41, p < .05), number of previous back surgeries (r =

-.40, $p < .05$), preoperative WBC ($r = .34$ to .40, $p < .05$), and pain medication from 4 PM on OR day to 4 AM on POD 1 ($r = .36$ to .41, $p < .05$). These variables were entered into the multiple regression models.

Variables from the regressions accounting for the greatest amount of variance are represented in Table 4. The highest percentage of predicted variance ($R^2 = .57$) occurred on POD 1 from 8 AM to 8 PM ($F[3,35] = 15.64$, $p < .001$) where the previous 12 hour pain intensity rating contributed the greatest weight (Beta = .48) to the model followed by height (Beta = -.31). As noted earlier, this preceding time period was the same time when MLD patients had decreasing pain medication for the entire 12 hours. The previous pain intensity ratings continued to predict the pain intensity rating on POD 2 from 8 AM to 8 PM with a Beta of .53.

Height was the demographic variable that predicted postoperative pain the most with an indirect relationship indicating that as height increased, pain decreased (Beta = -.31 to -.43). Patients entering the hospital through AM admissions experienced more pain from 12 to 36 hours after admission (Beta = .41 to .29 respectively). The number of previous back surgeries was inversely related (Beta = -.46) to postoperative pain. This may indicate that patients not experiencing back surgery before require extra instruction regarding postoperative pain management. The amount of pain medication given during the night of the day of surgery influenced the pain intensity rating for the following night (Beta = .34).

Insert Table 4 about here

Total Joints. Variables with significant correlation coefficients for the total joint patients were: the previous pain intensity ratings ($r = .34$, $p < .05$ to $r = .63$, $p < .001$), height ($r = -.28$, $p < .05$), the number of previous joint surgeries ($r = .28$, $p < .05$ to $r = .41$, $p < .001$), previous morphine equivalents ($r = .28$, $p < .05$ to $r = .34$, $p <$

.01), and the patients' acceptable levels of pain (r = .33, p < .05). Previous pain intensity ratings demonstrated the strongest relationship to the next pain intensity time interval. This supports the belief of preventing pain before it becomes severe, otherwise pain builds upon itself making it more difficult to control.

These variables were entered into the regression models. Variables accounting for the greatest amount of variance are represented in Table 5. Similar to the MLD population, the highest percentage of variance predicted (R^2 = .53) occurred on POD 1 from 8 AM to 8 PM (F [3,53] = 19.87, p <.001). Again, the previous pain intensity ratings contributed the most weight to this relationship (Beta = .51). All other time periods contained predictor variables accounting for approximately half of the variance (R^2 = .49 to .52) except for OR day from 8 AM to 8 PM, and from 8 PM on POD 1 to 8 AM on POD 2 which had predictor variables accounting for about one-fourth of the variance (R^2 = .20 & .25 respectively). Similar to MLD patients, previous pain intensity ratings were the strongest predictors of postoperative pain (Beta = .29 to .70). The variable predicting the strongest relationship to postoperative pain intensity was the pain intensity ratings from 8 AM to 8 PM on POD 2 (Beta = .70). This single variable accounted for half of the variance (R^2 = .49) of pain in the following time period from 8 PM on POD 2 to 8 AM on POD 3 (F [1,27] = 25.97, p <.001). This is especially noticeable when referring back to Figures 2 and 3. As pain intensity was increasing during this time, especially with the THA patients, pain medication was generally decreasing. This supports the importance of managing pain beyond the first and second postoperative days, as well as the belief that uncontrolled pain will produce more uncontrolled pain if not effectively managed.

Other variables that seemed to predict postoperative pain included having more previous joint surgeries, being shorter in height, having an AM admission, being a male, selecting a higher acceptable level of pain, not receiving Versed, Valium, or an analgesic preoperatively, and not

being married. Most of these variables seemed to predict only immediate postoperative pain (first 24 hours) with the exception of receiving preoperative medication and not being married. These variables were not as strong in predicting postoperative pain as the previous pain intensity ratings were (Beta = -.40 to .36).

Insert Table 5 about here

Chapter 5

Manuscript for Publication (cont.)

Discussion

MLD patients were undermedicated from 4 PM on OR day to 8 AM on POD 1, and again during the night from midnight on POD 1 to 4 AM on POD 2. Patients undergoing THA had less pain at night than MLD or TKA patients, but were not medicated sufficiently prior to afternoon activities. It is speculated that the afternoon pain intensity peaks were probably the result of physical activity. THA patients were medicated better immediately after surgery than MLD or TKA patients although the total pain medications given to THA patients were less than for MLD or TKA patients from noon to 8 PM on OR day. MLD patients may have been more active immediately postoperatively. This may explain why MLD patients experienced more pain than THA patients, but they were not medicated as well. Perhaps nurses didn't feel MLD patients should have as much pain as THA or TKA patients postoperatively. This might be substantiated by the fact that MLD patients had higher mean pain intensity ratings than THA patients for every four hour time interval. It is uncertain why TKA patients received more pain medication in the afternoons than THA patients. Perhaps physical therapy was more aggressive, or TKA patients are expected to do more than THA patients on POD 2 and POD 3, or nurses felt TKA patients had more pain than THA patients.

Peak pain intensity ratings occurred mainly during the first 24 hours after surgery for all three surgical groups. This would seem to indicate that these patients were not being medicated enough in the immediate postoperative period. Perhaps nurses were hesitant to medicate patients sufficiently as they were recovering from anesthesia. Overall, THA patients had less postoperative pain than TKA or MLD patients as reflected by both the NRS pain intensity ratings and the MPQ sensory and affective pain ratings. This agrees with the findings of Giuffre et al. (1991). THA patients also received less postoperative

pain medication than TKA or MLD patients. Since the THA patients' preoperative sensory ratings were higher than TKA patients and preoperative affective ratings were higher than both TKA and MLD patients, perhaps THA patients were more relieved that their preoperative pain was gone; or perhaps they weren't as active as MLD or TKA patients during the first three postoperative days. One must also consider tolerance levels as described by McCaffery and Beebe (1989). Since THA patients had a wider range of preoperative pain duration (3-480 months) than either the MLD or the TKA patients (1-96 & 1-240 months respectively), perhaps they developed more of a tolerance to pain; and thus reported less postoperative pain, and requested less pain medication. All three populations described their postoperative pain as more sensory than affective. This agrees with the findings of Crutchfield et al. (in press) for the TKA population. However, unlike their findings, the sensory and affective ratings of the TKA patients were higher in the immediate postoperative period than in the preoperative period for this study.

The majority of patients in this study received "as needed" pain medication. The opposing peaks and valleys of pain intensity compared with the amount of pain medication given (evident in Figures 1-3) support existing literature demonstrating the inconsistencies of this method of pain management in the immediate postoperative period. The lowest mean pain intensity ratings for all three surgical groups occurred in the early morning of POD 2. This seems to indicate it took the average patient from 36 to 40 hours postoperatively to obtain their lowest mean pain intensity score. Postoperative pain did not always decrease over time which agrees with the findings of Tittle et al. (1992). Even though the results of this study seem to show some improvement in pain management over studies 10 years ago, patients are still experiencing the most postoperative pain in the immediate hours following surgery. This seems to indicate some nurses may still be

hesitant to medicate patients sufficiently for pain in the immediate postoperative period.

It is apparent that in this study previous pain intensity was the strongest predictor of subsequent postoperative pain. This agrees with a similarly designed study of 72 abdominal surgery patients (Nass, Kampschnieder, Zimmerman & Pozehl, 1994). In this study previous pain intensity accounted for the majority of the variance. This lends support to the need to aggressively prevent the cumulative effects of postoperative pain or subsequent pain will be more difficult to manage. Literature has indicated the complications of inadequate postoperative pain management (Acute Pain Management Guideline Panel, 1992).

Patients who received teaching concerning pain management in AM admissions seemed to have more postoperative pain in the first 12 hours following surgery, regardless of which surgical group they were in. This could indicate that the pain management instruction given to these patients was not as thorough as the instruction given to patients who were inpatients or had PREP instruction. Perhaps patients received information in too short of time and in an atmosphere that was too hectic to adequately assimilate. Anxiety may also have been higher in this population. The method and time of preoperative pain instruction may require further investigation to determine how much of a role it determines in predicting postoperative pain.

THA and TKA patients seemed to have less postoperative pain if they received preoperative medication consisting of Valium, Versed, and or an analgesic (morphine or meperidine). The relationship of preoperative medication to postoperative pain was observed as far away as POD 3. Further studies focusing on the description and intensity of postoperative pain in patients receiving preoperative analgesic or sedation may be beneficial.

Implications

The description of pain in this study indicates some improvements in pain management, but continues to indicate areas of need. Ideally,

with adequate pain prevention and maintenance interventions, pain intensity rating increases should be controlled. Certainly, as pain intensity increases, treatment interventions should increase. Perceptive individualized postoperative pain assessments are required, especially if implementing "as needed" therapies that depend more on the nursing staff to deliver. Utilizing alternate methods of pain control for patients who are willing and able to manage their own postoperative pain may be beneficial especially as managed care moves more into the acute care setting. For example, a thorough understanding of the patient's subjective experience of postoperative pain and the factors that may predict that pain may provide the health care team with vital information necessary to develop more specific guidelines and enhance nursing interventions and pain management. Since the previous pain intensity rating predicted subsequent pain in this study, perhaps the care provider needs to consider this factor more closely when deciding how much pain medication to administer. The previous pain intensity should also be considered when evaluating the effectiveness of pain interventions. Theory development may also be enhanced by providing descriptions of the postoperative pain experience in these populations. This knowledge may also help the health care team communicate more clearly concerning pain, evaluate the effectiveness of pain interventions, and clearly document the events surrounding the pain experience. In addition, the knowledge obtained from this study may help support therapeutic management strategies or plan new strategies that may even help prevent some postoperative pain from occurring.

Postoperative pain is a subjective experience that remains a challenge and continues to require further attention in order to better understand how to effectively manage it. This study indicated that patients experienced their highest pain intensity in the immediate postoperative period while simultaneously receiving less pain medication. Previous pain intensity ratings were the strongest

predictors of postoperative pain. Further studies are required to substantiate the findings of this study.

References

Acute Pain Management Guideline Panel. (1992). Acute pain management: Operative or medical procedures and trauma. Clinical practice guideline. (AHCPR Publication No. 92-0032). Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services.

Balfour, S. E. (1989). Will I be in pain? Patients' and nurses' attitudes to pain after abdominal surgery. Professional Nurse, 5(1), 28-33.

Benzon, H. T. (1989). Postoperative pain and its management. Resident & Staff Physician, 35(4), 21-26.

Boss, B. J. (1987). Nursing assessment and role in management: Pain. In S. M. Lewis & I. C. Collier (Eds.), Medical-Surgical nursing: Assessment and management of clinical problems (2nd ed., pp. 1469-1496). New York, NY: McGraw-Hill.

Burckhardt, C. S. (1984). The use of the McGill Pain Questionnaire in assessing arthritis pain. Pain, 19, 305-314.

Byrne, M., Troy, A., Bradley, L., Marchisello, P., Geisinger, K., Van der Heide, L. H., & Prieto, E. (1982). Cross-Validation of the factor structure of the McGill Pain Questionnaire. Pain, 13, 193-201.

Camp, L. D., & O'Sullivan, P. S. (1987). Comparison of medical, surgical and oncology patients' descriptions of pain and nurses' documentation of pain assessments. Journal of Advanced Nursing, 12, 593-598.

Crutchfield, J., Zimmerman, L., Nieveen, J., Barnason, S., & Pozehl, B. (in press). Characteristics of preoperative and postoperative pain in total knee replacement (TKR) patients. Orthopedic Nursing.

Cohen, F. L. (1980). Postsurgical pain relief: Patients' status and nurses' medication choices. Pain, 9(2), 265-274.

Davis, G. C. (1989). The clinical assessment of chronic pain in rheumatic disease: Evaluating the use of two instruments. Journal of Advanced Nursing, 14(5), 397-402.

Donovan, M. I. (1990). Acute pain relief. Nursing Clinics of North America, 25(4), 851-861.

Donovan, M., Dillon, P., & McGuire, L. (1987). Incidence and characteristics of pain in a sample of medical-surgical inpatients. Pain, 30, 69-78.

Downie, W. W., Leatham, V. M., Rhind, V. M., Wright, V., Branco, J. A., & Anderson J. A. (1978). Studies with pain rating scales. Annals of the Rheumatic Diseases, 37, 378-381.

Edwards, W. T. (1990). Optimizing opioid treatment of postoperative pain. Journal of Pain and Symptom Management, 5(1), S24-S36.

Ferraz, M. B., Quaresma, M. R., Aquino, L. R. L., Atra, E., Tugwell, P., & Goldsmith, C. H. (1990). Reliability of pain scales in the assessment of literate and illiterate patients with rheumatoid arthritis. The Journal of Rheumatology, 17(8), 1022-1024.

Ferrell, B. R., Rhiner, M., & Rivera, L. M. (1993). Empowering patients to control pain. In S. M. Hubbard, P. E. Greene & M. T. Knobf (Eds.), Current issues in cancer nursing practice updates, (Vol. 2, pp. 1-9). Philadelphia, PA: J. B. Lippincott Co.

Ferrer-Brechner, T. (1989). Physical management of malignant pain. In C. D. Tollison (Ed.), Handbook of chronic pain management (pp. 2-5). Baltimore, MA: Williams & Wilkins.

Feuerstein. M. (1989). Definitions of pain. In C. D. Tollison (Ed.), Handbook of chronic pain management (pp. 2-5). Baltimore, MA: Williams & Wilkins.

Fortin, J. D., Schwartz-Barcott, D., & Rossi, S. (1992). The postoperative pain experience. Clinical Nursing Research, 1, 292-304.

Giuffre, M., Asci, J., Arnstein, P., & Wilkinson, C. (1991). Postoperative joint replacement pain: Description and opioid requirement. Journal of Post Anesthesia Nursing, 6(4), 239-245.

Gooch, J. (1989). Who should manage pain -- patient or nurse? Professional Nurse, 4(6), 295-296.

Graham, C., Bond, S., Geekovich, M., & Cook, M. R. (1980). Use of the McGill Pain Questionnaire in the assessment of cancer pain: Reliability and consistency. Pain, 8, 377-387.

Huskisson, E. C. (1974). Measurement of pain. The Lancet, 2, 1127-1131.

International Association for the Study of Pain. (1979). Pain terms: A list with definitions and notes on usage. Pain, 6, 249-252.

Ketovuori, H. (1987). Nurses' and patients' conceptions of wound pain and the administration of analgesics. Journal of Pain and Symptom Management, 2(4), 213-218.

Kremer, E., & Atkinson, J. H., Jr. (1981). Pain measurement: Construct validity of the affective dimension of the McGill Pain Questionnaire with chronic benign pain patients. Pain, 11, 93-100.

Kremer, E. F., Atkinson, J. H., Jr., & Ignelzi, R. J. (1981). Measurement of pain: Patient preference does not confound pain measurement. Pain, 10, 241-248.

Lavies, N., Hart, L., Rounsefell, B., & Runciman, W. (1992). Identification of patient, medical and nursing staff attitudes to postoperative opioid analgesia: Stage 1 of a longitudinal study of postoperative analgesia. Pain, 48, 313-319.

Lowe, N. K., Walker, S. N., & MacCallum, R. C. (1991). Confirming the theoretical structure of the McGill Pain Questionnaire in acute clinical pain. Pain, 46(1), 53-60.

Ludwig-Beymer, P., Huether, S. E., & Schoessler, M. (1994). Pain, temperature regulation, sleep, and sensory function. In K. L. McCance & S. E. Huether (Eds.), Pathophysiology: The biologic basis for disease in adults and children (2nd ed., pp. 437-447). St. Louis, MO: Mosby.

Marks, R. M., & Sachar, E. J. (1973). Undertreatment of medical inpatients with narcotic analgesics. Annals of Internal Medicine, 78(2), 173-181.

McCaffery, M., & Beebe, A. (1989). Pain: Clinical manual for nursing practice. St. Louis, MO: Mosby.

McGuire, D. B. (1984). The measurement of clinical pain. Nursing Research, 33(3), 152-156.

Melzack, R. (1975). The McGill Pain Questionnaire: Major properties and scoring methods. Pain, 1, 277-299.

Melzack, R., Abbott, F. V., Zackon, W., Mulder, D. S., & Davis, M. W. L. (1987). Pain on a surgical ward: A survey of the duration and intensity of pain and the effectiveness of medication. Pain, 29, 67-72.

Melzack, R., & Katz, J. (1992). The McGill Pain Questionnaire: Appraisal and current status. In D. C. Turk & R. Melzack (Eds.), Handbook of pain assessment (pp. 152-168). New York, NY: The Guilford Press.

Melzack, R., & Torgerson, W. S. (1971). On the language of pain. Anesthesiology, 34(1), 50-59.

Melzack, R., & Wall, P. D. (1965). Pain mechanisms: A new theory. Science, 150(3699), 971-979.

Melzack, R., & Wall, P. D. (1970). Psychophysiology of pain. International Anesthesiology Clinics, 8, 3-34.

Miaskowski, C. (1993). Current concepts in the assessment and management of acute pain. MEDSURG Nursing, 2(1), 28-40.

Mooney, N. E. (1991). Pain management in the orthopedic patient. Orthopedic Nursing, 26(1), 73-87.

Murrin, K. R., & Rosen, M. (1985). Pain Measurement. In B. Smith & B. G. Covin (Eds.), Acute pain (pp. 104-132). London: Butterworths.

Nass, J. E., Kampschnieder, C., Zimmerman, L., & Pozehl, B. (1994). Factors that predict postoperative pain in abdominal surgical patients in a rural setting. Unpublished manuscript, University of Nebraska Medical Center at Omaha.

Preble, L. M., Guveyan, J. A., & Sinatra, R. S. (1992). Patient characteristics influencing postoperative pain management. In R. S. Sinatra, A. H. Hord, B. Ginsberg & L. M. Preble (Eds.), Acute pain: Mechanisms & management (pp. 140-150). St. Louis, MO: Mosby.

Prieto, E. J., Hopson, L., Bradley, L. A., Byrne, M., Geisinger, K. F., Midax, D., & Marchisello, P. J. (1980). The language of low back pain: Factor structure of the McGill Pain Questionnaire. Pain, 8, 11-19.

Reading, A. E. (1982). A comparison of the McGill Pain Questionnaire in chronic and acute pain. Pain, 13, 185-192.

Redelmeier, D. A., & Kahneman, D. (1992). The pain of invasive procedures: An evaluation of patients' experiences and memories of colonoscopy. Medical Decision Making, 12, 338.

Scott, I. (1992). Nurses' attitudes to pain control and the use of pain assessment scales. British Journal of Nursing, 2(1), 11-16.

Sriwatanakul, K., Weis, O. F., Alloza, J. L., Kelvie, W., Weintraub, M., & Lasagna, L. (1983). Analysis of narcotic analgesic usage in the treatment of postoperative pain. Journal of American Medical Association, 250(7), 926-929.

Strong, J., Ashton, R., & Chant, D. (1991). Pain intensity measurement in chronic low back pain. The Clinical Journal of Pain, 7, 209-218.

Taenzer, P. (1983). Postoperative pain: Relationships among measures of pain, mood, and narcotic requirements. In R. Melzack (Ed.), Pain measurement and assessment (pp. 111-118). New York, NY: Raven.

Tittle, M. B., Long, M. C., & McMillan, S. C. (1992). Measurement of pain in postoperative abdominal surgery patients. Applied Nursing Research, 5(1), 26-28.

Turk, D. C., & Rudy, T. E. (1989). A cognitive-behavioral perspective on chronic pain: Beyond the scalpel and syringe. In C. D. Tollison (Ed.), Handbook of chronic pain management (pp. 222-236). Baltimore, MA: Williams & Wilkins.

Turk, D. C., Rudy, T. E., & Salovey, P. (1985). The McGill Pain Questionnaire reconsidered: Confirming the factor structures and examining appropriate uses. Pain, 21(4), 385-397.

Wagstaff, S., Smith, O. V., & Wood, P. H. N. (1985). Verbal pain descriptors used by patients with arthritis. Annals of the Rheumatic Diseases, 44, 262-265.

Walding, M. F. (1991). Pain, anxiety and powerlessness. Journal of Advanced Nursing, 16, 388-397.

Zimmerman, L., Duncan, K., Pozehl, B., & Schmitz, R. (1987). Pain descriptors used by patients with cancer. Oncology Nursing Forum, 14(4), 67-71.

Zimmermann, M. (1981). Physiological mechanisms of pain and pain therapy. Triangle, 20(1/2) 7-19.

Appendix A

Institutional Review Board Approval

University of Nebraska
Institutional Review Board
For the Protection of
Human Subjects

University of Nebraska Medical Center
Eppley Science Hall 3018
600 South 42nd Street
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July 14, 1994

Joanne Rowles, R.N.
College of Nursing
UNMC - 3132

IRB # 278-94

TITLE OF APPLICATION/PROTOCOL: Teaching Interventions Effect on Selected Pain Outcomes

Dear Ms. Rowles:

The Institutional Review Board (IRB) for the Protection of Human Subjects has completed its review of the above titled protocol and informed consent document(s), including any revised material submitted in response to the IRB's review. The Board has expressed it as their opinion that you are in compliance with all applicable federal regulations and you have provided adequate safeguards for protecting the rights and welfare of the subjects to be involved in this study. The IRB has, therefore, granted unconditional approval of your research project. This letter constitutes official notification of the final approval and release of your project by the IRB, and you are authorized to implement this study accordingly.

We wish to remind you that, under the provisions of this institution's Multiple Project Assurance for compliance with DHHS Regulations for the Protection of Human Subjects (MPA #1509), the principal investigator is directly responsible for submitting to the IRB any proposed change in the research or the consent document(s). In addition, any unanticipated adverse events involving risk to the subject or others must be reported to the IRB in writing immediately. This project is subject to periodic review and surveillance by the Board and, as part of their surveillance, the Board may request periodic reports of progress and results. For projects which continue beyond one year from the starting date, it is the responsibility of the principal investigator to initiate a request to the Board for annual review and update of the research project.

Sincerely,

Ernest D. Prentice, Ph.D.
Vice Chairman, IRB

EDP/abk

Appendix B

Tools and Data Collection Forms

Numeric Rating Scale (NRS)

McGill Pain Questionnaire (MPQ)

Patient Interview Demographic Data Form

Chart Demographic Data Form

MPQ and Morphine Equivalent Data Collection Form

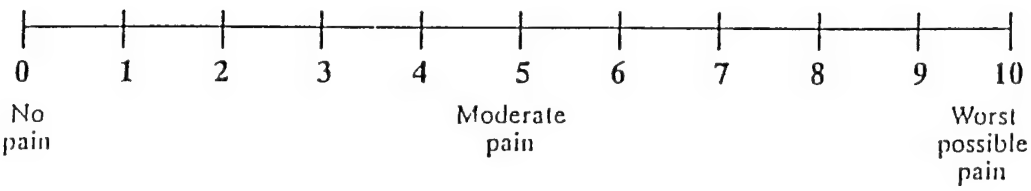
Pain History and Assessment Form

Other Factors Associated With Pain Form

Pain Assessment Documentation Form

Written Consent Form

0–10 Numeric Pain Intensity Scale[1]



[1]If used as a graphic rating scale, a 10 cm baseline is recommended.

SUBJECT NO. _____ DAY_____

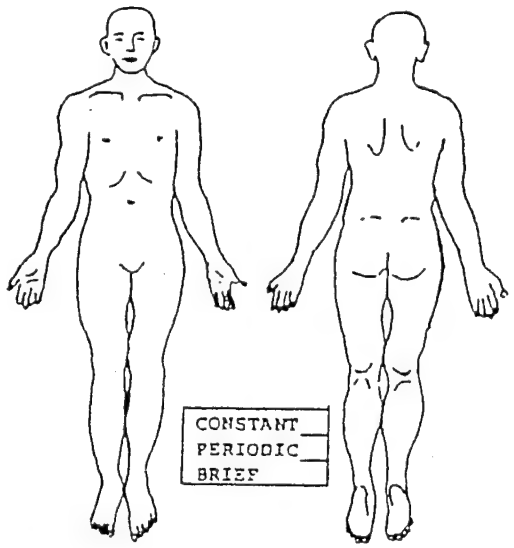
McGill - Melzack Pain Questionnaire

Patient's Name_____Date_____Time_____am/pm
Analgesic(s) _____ Dosage_____Time Given _____am/pm
_____ Dosage_____Time Given_____am/pm

Analgesic Time Difference (hours): +4 +1 +2 +3
PRI: S_____ A_____ E_____ M(S)_____ M(AE)_____ M(T)_____PRI(T)____
(1-10) (11-15) (16) (17-19) (20) (17-20) (1-20)

1 FLICKERING	11 TIRING	
QUIVERING	EXHAUSTING	
PULSING	12 SICKENING	
THROBBING	SUFFOCATING	
BEATING	13 FEARFUL	
POUNDING	FRIGHTFUL	
2 JUMPING	TERRIFYING	
FLASHING	14 PUNISHING	
SHOOTING	GRUELLING	
3 PRICKING	CRUEL	
BORING	VICIOUS	
DRILLING	KILLING	
STABBING	15 WRETCHED	
LANCINATING	BLINDING	
4 SHARP	16 ANNOYING	
CUTTING	TROUBLESOME	
LACERATING	MISERABLE	
5 PINCHING	INTENSE	
PRESSING	UNBEARABLE	
GNAWING	17 SPREADING	
CRAMPING	RADIATING	
CRUSHING	PENETRATING	
6 TUGGING	PIERCING	
PULLING	18 TIGHT	
WRENCHING	NUMB	
7 HOT	DRAWING	
BURNING	SQUEEZING	
SCALDING	TEARING	
SEARING	19 COOL	
8 TINGLING	COLD	
ITCHY	FREEZING	
SMARTING	20 NAGGING	
STINGING	NAUSEATING	
9 DULL	AGONIZING	
SORE	DREADFUL	
HURTING	TORTURING	
ACHING	PPI	
HEAVY	0 No pain	
10 TENDER	1 MILD	
TAUT	2 DISCOMFORTING	
RASPING	3 DISTRESSING	
SPLITTING	4 HORRIBLE	
	5 EXCRUCIATING	

PPI_____ COMMENTS:



CONSTANT
PERIODIC
BRIEF

ACCOMPANYING SYMPTOMS:	SLEEP:	FOOD INTAKE:
NAUSEA	GOOD	GOOD
HEADACHE	FITFUL	SOME
DIZZINESS	CAN'T SLEEP	LITTLE
DROWSINESS	COMMENTS:	NONE
CONSTIPATION		COMMENTS:
DIARRHEA		
COMMENTS:	ACTIVITY:	COMMENTS:
	GOOD	
	SOME	
	LITTLE	
	NONE	

Subject Number_____

PATIENT INTERVIEW DEMOGRAPHIC DATA

Patient Hospital Number _____

Group:
1. Preop Teaching
2. Discharge Teaching
3. Preop and Discharge Teaching
4. Control

Age (in years): _____

OR Date: _____

Height: _____ (inches)

Weight: _____ (kg)

Sex:
1. Male _____
2. Female _____

Race:
1. White _____
2. Black _____
3. Hispanic_____
4. Indian _____
5. Oriental _____
6. Other _____ (specify)

Religion:
1. Catholic _____
2. Protestant _____
3. Jewish _____
4. None _____
5. Other _____ (specify)

Marital Status:
1. Married _____
2. Single _____
3. Widowed _____
4. Divorced _____
5. Separated _____

Education:
Years in School _____

Occupation:
1. Professional _____
2. Technical _____
3. Retired _____
4. Farmer _____
5. Housewife_____
6. Other_____(specify)

Subject Number_____

Primary Diagnosis:_____

ALLERGIES TO MEDICATION:_____

Previous Medications:

Pain Med	Dosage	Route	Frequency	How long on med?

Other Meds	Dosage	Route	Frequency	How long on med?

Subject Number _____

CHART DEMOGRAPHIC DATA

Date of Admission _____ Telephone Number_____
Discharge Date: _____
Length of Stay _____

Disposition Plan:
1. Home
2. Extended Care _____
3. Other _____ (Specify)

Type of surgery done: _____
1. Back 4. Rt. Knee
2. Rt. Hip 5. Lt. Knee
3. Lt. Hip

Preoperative medication: (include: time, drug, dosage, route)
1._____
2._____
3._____
4._____

Anesthesia: General_____ Spinal_____

Anesthetic Agents:
1._____
2._____
3._____
4._____
5._____
6._____

OR Start Time: _____ OR Stop Time: _____
Total Time in OR (minutes) _____

Type of Prosthesis:_____

Length of Incision(millimeters):_____

Time returned to room from PACU (military time): _____

PCA Used: YES NO OR Day ____ Day 1 ____ Day 2 ____ Day 3 ____

Epidural: YES NO OR Day ____ Day 1 ____ Day 2 ____ Day 3 ____

Drain to surgical site: 1. YES____ Start (Date) _____ Stop _____
2. NO ____

CPM: YES NO OR Day ____ Day 1 ____ Day 2 ____ Day 3 ____
Day 4 ____ Day 5 ____ Day 6 ____ Day 7 ____ Day 8 ____

Postoperative Day PT Started:_____

Subject Number _____

Medications During Hospitalization:

Meds	Dosage	Route	Frequency

TEDS: 1. Unilateral OR Day ____ Day 1 ____ Day 2 ____
2. Bilateral Day 3 ____ Day 4 ____ Day 5 ____
3. None Day 6 ____ Day 7 ____ Day 8 ____

Compression Boots:
1. Unilateral OR Day ____ Day 1 ____ Day 2 ____
2. Bilateral Day 3 ____ Day 4 ____ Day 5 ____
3. None Day 6 ____ Day 7 ____ Day 8 ____

Immobilizer Used: Yes No OR Day ____ Day 1 ____ Day 2 ____
Day 3 ____ Day 4 ____ Day 5 ____

Abduction Pillow: Yes No OR Day ____ Day 1 ____ Day 2 ____
Day 3 ____ Day 4 ____ Day 5 ____

Ace Wraps:
1. Unilateral OR Day ____ Day 1 ____ Day 2 ____
2. Bilateral Day 3 ____ Day 4 ____ Day 5 ____
3. None

Cold Therapy:
1. Ice Pack OR Day ____ Day 1 ____ Day 2 ____
2. CCP Day 3 ____ Day 4 ____ Day 5 ____
3. None Day 6 ____ Day 7 ____ Day 8 ____

Laboratory Data

Pre-op:	HGB_____	HCT_____	WBC_____	Creatinine_____	PROTIME ____
OR Day:	HGB_____	HCT_____			PROTIME ____
POD 1:	HGB_____	HCT_____			PROTIME ____
POD 2:	HGB_____	HCT_____			PROTIME ____
POD 3:	HGB_____	HCT_____			PROTIME ____
POD 4:	HGB_____	HCT_____			PROTIME ____
POD 5:	HGB_____	HCT_____			PROTIME ____
POD 6:	HGB_____	HCT_____			PROTIME ____
POD 7:	HGB_____	HCT_____			PROTIME ____
POD 8:	HGB_____	HCT_____			PROTIME ____

Subject No. _____

MPQ PACKAGE

	PRE	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10	D/C3	D/C6
CURR MOOD													
CURR VRS													
MPQ													

OVER 24 HOURS

Over the past 24 hours how much has the pain interfered with your sleep? appetite? physical activity? mood?

0=does not interfer 10=completely interfers

SLEEP													
APPET													
PHYS													
MOOD													
WORST PAIN													

M.S. EQUIVALENTS

	PRE	OR DAY	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7	DAY 8	DAY 9	DAY 10
2400-0400												
0400-0800												
0800-1200												
1200-1600												
1600-2000												
2000-2400												
24 hr. Total												

Subject Number_____

PAIN HISTORY & ASSESSMENT

Please describe any previous experiences of pain and how it affected you.

Do you have any concerns about taking any pain medications? If so please explain?

Please describe your typical behaviors when you are in pain.

Do you have a preference on how you would like your pain managed (e.g. PCA pump, IM injections)?

What is an acceptable level of pain for you after surgery (on a scale of 0-10, with 0 = No pain and 10 = Worst pain possible)?

Does your family have any concerns or suggestions about your pain management? If so please explain.

Where is your pain located?

How long have you had your pain? (specify in months and years)

Does something trigger your pain? If so, please explain.

Describe in your own words what the pain feels like.

What makes the pain better?

What makes the pain worse?

What has helped your pain in the past?

Subject Number_____

What has NOT helped your pain in the past?

What other symptoms accompany your pain?

What do you think is causing your pain now?

On a scale of 0-10, please rate how much you think each of the chronic diseases below have affected your pain intensity. (0 indicates "NOT AT ALL" and 10 indicates "VERY MUCH".

Chronic Diseases: _____rating_____

_____rating_____

_____rating_____

_____rating_____

Previous surgery: YES ____ NO _____ IF YES, HOW MANY _____

Previous joint/
back surgery YES ____ NO _____ IF YES, HOW MANY _____

Previous use of
PCA Pump YES ____ NO _____

Your evaluation of it's effectiveness (on a scale of 0-10) with "0" not effective and "10" very effective _____

Subject Number_____

OTHER FACTORS ASSOCIATED WITH PAIN

Read the following questions to your subjects and ask them to rate on a scale of (0 to 10) how much they perceive their pain interrupted the following activities.

1. How much does your pain disrupt your sleep? _____

   0 = Does not disrupt my sleep

   10 = Completely disrupts my sleep

2. How much does the pain interfere with your appetite? _____

   0 = Does not interfere with my appetite

   10 = Completely interferes with my appetite

3. How much does the pain interfere with your physical activity? _____

   0 = Does not interfere with my physical activity

   10 = Completely interferes with my physical activity

4. How much does your pain interfere with your mood? _____

   0 = Does not interfere with my mood

   10 = Completely interferes with my mood

PAIN ASSESSMENT DOCUMENTATION FORM

Subject No.: _____

Name: _____ Chart No.: _____

OR Date: _____

Time	Day of Surgery	POD 1	POD 2	POD 3	POD 4	POD 5	POD 6	POD 7
4:00 a.m.								
8:00 a.m.								
12 noon								
4:00 p.m.								
8:00 p.m.								
12 midnite								

INSTRUCTIONS:

Please place the numeric value of the patient's reported pain (pain scale: 0-10) in the corresponding box for the designated day and time.

When patient has been discharged, please place this form on the Clinical Supervisor's desk. THANKS!!!!!! DEAN, DOROTHY & JOANNE.

University
of Nebraska
Medical Center
College of Nursing

600 South 42nd Street
Omaha, NE 68198-5330
Fax #: 402/559-7570

IRB#: 278-94

CONSENT FORM

TITLE OF RESEARCH STUDY

TEACHING INTERVENTIONS EFFECT ON SELECTED PAIN OUTCOMES

INVITATION TO PARTICIPATE

You are invited to participate in this research study. The following information is provided in order to help you to make an informed decision whether or not to participate. If you have any questions please do not hesitate to ask.

BASIS FOR SUBJECT SELECTION

You are eligible to participate because you are scheduled for a Total Hip Replacement (THR), Total Knee Replacement (TKR), or Microlumbar Discectomy (MLD) at Nebraska Methodist Hospital.

PURPOSES OF THE STUDY

The primary purposes of this study are to test the effectiveness of a supplemental preoperative and discharge teaching program for pain management; and to describe the postoperative pain experience and satisfaction with pain management received. A secondary purpose of this study is to describe postoperative pain and to identify factors that predict postoperative pain (for example age, gender, length of time in surgery, and number of previous surgeries).

EXPLANATION OF PROCEDURES

Before surgery: If you agree to participate, you will be randomly assigned to one of the following groups: 1) supplemental preoperative teaching about pain, 2) supplemental discharge teaching about pain, 3) supplemental preoperative and discharge teaching about pain, or 4) no supplemental preoperative or discharge teaching (control group). A research nurse will then ask you questions and fill out the demographic data and pain history form, a pain questionnaire, a knowledge test on pain management, and a questionnaire dealing with functional status and social status. This should take approximately 40-55 minutes to complete (depending on your group assignment). Regardless of your group assignment, you will receive the preoperative and discharge teaching currently being given to all patients.

Subject's Initials _____

After surgery: Each person will participate in the study throughout the hospital stay. Every 4 hours for the first four days after surgery, and then every 8 hours (starting at midnight on the fourth day) for the rest of your hospital stay, the nurse caring for you will ask you to rate your pain on a scale of "0" to "10" with "0" indicating NO PAIN and "10" indicating WORST POSSIBLE PAIN. A research nurse will visit you at approximately the same time (4:00 PM) every day after surgery to administer the McGill Pain Questionnaire (MPQ) and measure your pain intensity and how pain influences sleep, appetite, physical activity, and mood which requires approximately 15 minutes to administer.

At discharge: You will be asked to complete a short questionnaire indicating how satisfied you were with your pain management and to retake a pain management assessment. A research nurse will administer the McGill Pain Questionnaire again and measure your pain intensity. You will again be asked how your pain influences your sleep, appetite, physical activity, and mood. This will take approximately 30-40 minutes to complete.

At home: Three weeks and six weeks after you go home you will be contacted by phone by a research nurse. You will be asked to complete the same tools you did in the hospital. This will require approximately 40-60 minutes to complete with each call.

POTENTIAL RISKS AND DISCOMFORTS

There are no known risks associated with this study.

POTENTIAL BENEFITS TO SUBJECTS

There may be no direct benefit to you. However, there could be the potential benefit of less pain, and increased knowledge about pain management.

POTENTIAL BENEFITS TO SOCIETY

Results from this study will help practitioners better understand the effectiveness of different interventions (patient education concerning pain management in the hospital and at home) in managing pain in the postoperative patient. The results will also provide a better understanding of postoperative patient's pain experience and the factors that might predict postoperative pain.

FINANCIAL OBLIGATION

There is no financial obligation incurred by participating in this study.

ASSURANCE OF CONFIDENTIALITY

Any information obtained in this study which could identify you will be kept strictly confidential. The information obtained in this study may

Subject's Initials _____

be published in scientific journals or presented at scientific meetings, but your identity will be kept strictly confidential.

RIGHTS OF RESEARCH SUBJECTS

Your rights as a research subject have been explained to you. If you have any additional questions concerning your rights you may contact Nebraska Methodist Hospital Nursing Research Committee telephone 402/390-4000; or the University of Nebraska Institutional Review Board (IRB), telephone 402/559-6463.

VOLUNTARY PARTICIPATION AND WITHDRAWAL

Participation is voluntary. Your decision whether or not to participate will not affect your present or future medical treatment at Nebraska Methodist Hospital, nor prejudice your relationship with the University of Nebraska Medical Center. If you decide to participate, you are free to withdraw at any time.

DOCUMENTATION OF INFORMED CONSENT

YOU ARE VOLUNTARILY MAKING A DECISION WHETHER OR NOT TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE CERTIFIES THAT THE CONTENT AND MEANING OF THE INFORMATION ON THIS CONSENT FORM HAVE BEEN FULLY EXPLAINED TO YOU AND THAT YOU HAVE DECIDED TO PARTICIPATE HAVING READ AND UNDERSTOOD THE INFORMATION PRESENTED. YOUR SIGNATURE ALSO CERTIFIES THAT YOU HAVE HAD ALL YOUR QUESTIONS ANSWERED TO YOUR SATISFACTION. IF YOU THINK OF ANY ADDITIONAL QUESTIONS DURING THE STUDY, PLEASE CONTACT THE INVESTIGATORS. YOU WILL BE GIVEN A COPY OF THIS CONSENT FORM TO KEEP.

_____ _____

SIGNATURE OF SUBJECT DATE

IN MY JUDGEMENT THE SUBJECT IS VOLUNTARILY AND KNOWINGLY GIVING INFORMED CONSENT AND POSSESSES THE LEGAL CAPACITY TO GIVE INFORMED CONSENT TO PARTICIPATE IN THIS RESEARCH STUDY.

_____ _____

SIGNATURE OF INVESTIGATOR DATE

INVESTIGATORS:

JOANNE R. ROWLES, R.N., B.S.N.	551-8309 (DAY)	551-8309 (NIGHT)
DOROTHY J. JONES, R.N., B.S.N.	390-4085 (DAY)	292-0713 (NIGHT)
DEAN F. DEGNER, R.N., B.S.N.	293-8978 (DAY)	293-8978 (NIGHT)
LANI ZIMMERMAN, R.N., PH.D.	472-3847 (DAY)	488-8884 (NIGHT)
BUNNY POZEHL, R.N., PH.D.	472-7352 (DAY)	421-7352 (NIGHT)

Subject's Initials _____

Table 1

Demographic Frequencies and Percentages for the Sample - (N = 106)

Characteristic	n	%
Sex - Male	43	40.6
Female	63	59.4
Race - White	104	98.1
Black	2	1.9
Religion -		
Catholic	28	26.4
Protestant	63	59.4
None	4	3.8
Other	11	10.4
Marital Status		
Married	75	70.8
Single	7	6.6
Widowed	20	18.9
Divorced	4	3.8
Occupation		
Professional	10	9.4
Technical	49	46.2
Retired	47	44.3

(table continues)

Table 1 (continued)

Demographic Frequencies and Percentages for the Sample - (N = 106)

Characteristic	n	%
Diagnosis		
Osteo/Arthritis/DJD	58	55.2
Herniated Disc	39	37.1
Joint Revision	5	4.8
Avasc Necrosis	2	1.9
Ruptured Disc	1	1.0
Type of Surgery		
MLD	41	38.7
Lt TKA	23	21.7
Rt TKA	21	19.8
Rt THA	12	11.3
Lt THA	9	8.5

Note. Osteo = Osteoarthritis, DJD = Degenerative Joint Disease, Avasc = Avascular, MLD = Microlumbar Discectomy, Rt = right, THA = Total Hip Arthroplasty, Lt = left, TKA = Total Knee Arthroplasty.

Table 2

Demographic Variable Means and Standard Deviations for the Sample (N = 106)

Variable	M	SD
Age	58.8	16.7
Height (inches)	66.9	3.9
Weight (kilograms)	86.0	18.0
Education (years)	13.0	2.5
Months of preoperative pain (n=99)	45.2	70.1
Previous surgeries	3.0	2.4
Length of stay	4.2	2.0
Accepted level of pain (n=102)	3.6	2.1
Previous joint or back surgery (n=91)	0.7	1.0
Time in surgery (minutes)	81.8	31.6
Days on PCA (n=83)	0.8	1.0
Days drain in (n=75)	0.8	1.0
Days on CPM (n=102)	1.6	2.0

Note. PCA = Patient Controlled Analgesia, CPM = Continuous Passive Movement.

Table 3

Demographic Variable Means and Standard Deviations by Surgical Group - (N = 106)

	MLD *M* (*SD*)	THA *M* (*SD*)	TKA *M* (*SD*)
Age	42.5(11.7)	67.6(11.4)	69.8(9.0)
Months of Preop Pain	13.0(20.3)	65.0(117.6)	66.7(59.0)
Length of Stay	2.4(1.3)	5.7(1.6)	5.2(1.3)
	MLD *n* (%)	THA *n* (%)	TKA *n* (%)
Sex - Males	17(41.5)	13(61.9)	13(29.5)
Females	24(58.5)	8(38.1)	31(70.5)
Occupation			
Professional	28(19.5)	2(9.5)	0(0.0)
Technical	30(73.1)	7(33.3)	12(27.2)
Retired	3(7.3)	12(57.1)	32(72.7)

Note. MLD = Microlumbar Discectomy, THA = Total Hip Arthroplasty, TKA = Total Knee Arthroplasty, Preop = Preoperative.

Table 4.

Stepwise Multiple Regression Analyses for each Pain Intensity (NRS) Time Period Among the Study Variables for MLDs

Time Period / Predictor	OR Day 0800-OR Day 2000 NRS Beta	OR Day 2000-POD1 0800 NRS Beta	POD1 0800-POD1 2000 NRS Beta	POD1 2000-POD2 0800 NRS Beta	POD2 0800-POD2 2000 NRS Beta
OR Day 2000-POD1 0800 NRS			.48		
POD1 2000-POD2 0800 NRS					.53
MS equiv. OR Day 1600-POD1 0400				.34	
Height (inches)	-.43		-.31	-.41	
No. of back/joint surgeries	-.46				
AM Admit vs PREP/inpt admit		.41	.29		
Test Model	df(2,31)	df(1,37)	df(3,35)	df(2,27)	df(1,27)
F =	8.05**	7.48**	15.64***	8.18**	10.62**
R^2 =	.34	.17	.57	.38	.28

Note. NRS = Numeric Rating Scale, MLDs = Microlumbar Discectomies, OR = Operative, POD = Postoperative day, MS equiv = Morphine Sulfate equivalents (mg/kg of body wt), AM Admit = Morning admissions, PREP inpt admit = Preoperative Registration & Education Program or inpatient admission.

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 5.

Stepwise Multiple Regression Analyses for each Pain Intensity (NRS) Time Period Among the Study Variables for Joints

Time Period / Predictor	OR Day 0800-OR Day 2000 NRS Beta	OR Day 2000-POD1 0800 NRS Beta	POD1 0800-POD1 2000 NRS Beta	POD1 2000-POD2 0800 NRS Beta	POD2 0800-POD2 2000 NRS Beta	POD2 2000-POD3 0800 NRS Beta	POD3 0800-POD3 2000 NRS Beta
OR Day 0800-OR Day 2000 NRS		.54					
OR Day 2000-POD1 0800 NRS			.51	.50			
POD1 0800-POD1 2000 NRS					.29		
POD1 2000-POD2 0800 NRS					.31		
POD2 0800-POD2 2000 NRS						.70	
POD2 2000-POD3 0800 NRS							.51
No. of surgeries			.36				
Height (inches)			-.20				
AM Admission	.35						
Sex	.26						
Acpt. pain level		.30					
Versed/Valium/Anal vs no preop med		-.28			-.39		-.34
Married					-.22		
Test Model	df(2,53)	df(3,52)	df(3,53)	df(1,51)	df(4,48)	df(1,27)	df(2,45)
F =	6.74**	17.54***	19.87***	16.63***	13.23***	25.97***	21.63***
R^2 =	.20	.50	.53	.25	.52	.49	.49

Note. NRS = Numeric Rating Scale, Joints = Total Hip Arthroplasty & Total Knee Arthroplasty, OR = Operative, POD = Postoperative day, Acpt = acceptable, Anal = analgesic, preop med = other preoperative medication.

* p <.05 ** p <.01 *** p <.001

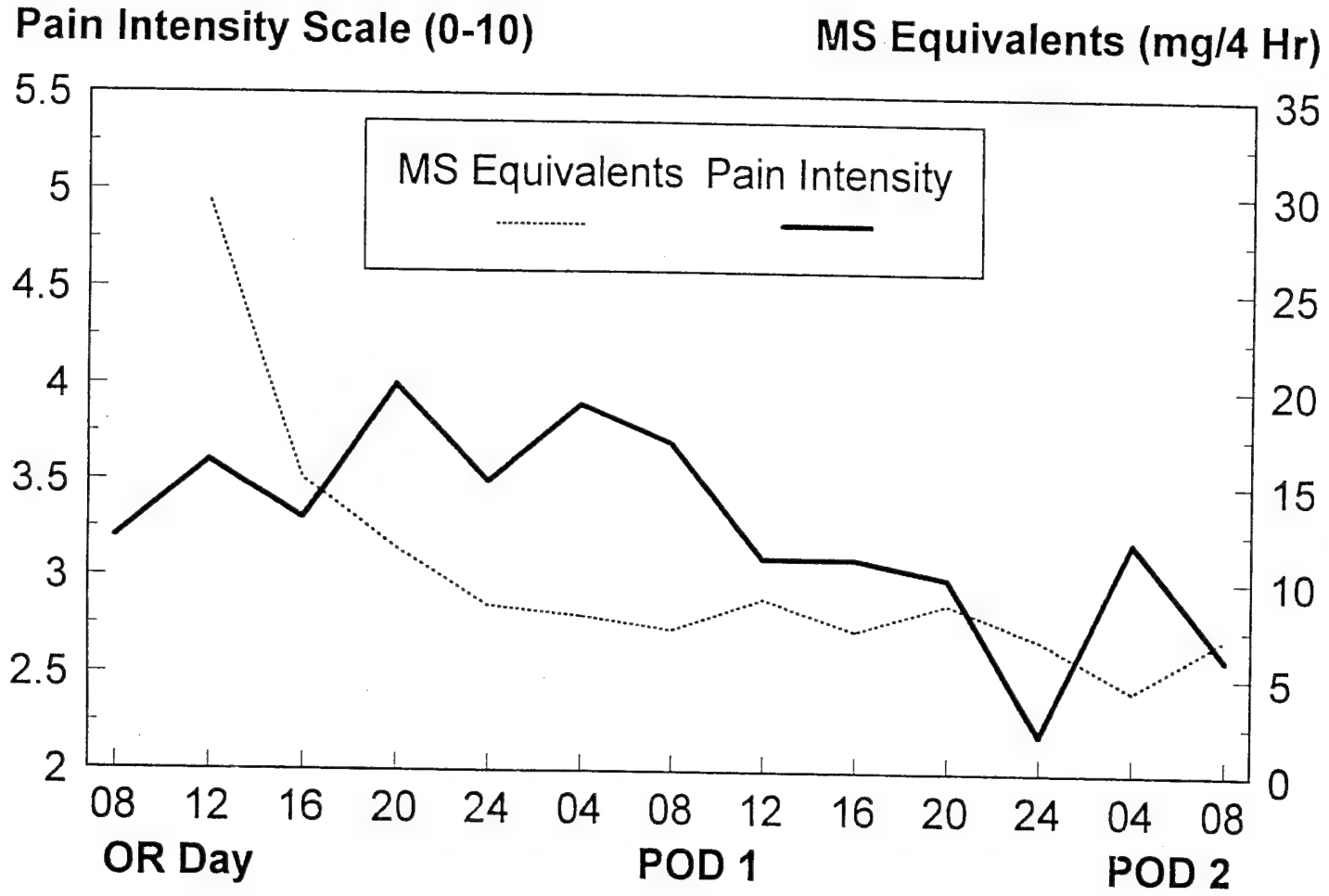


Figure 1. Numeric Rating Scale (NRS) Mean Pain Intensity Ratings Compared With Mean Morphine Sulfate (MS) Equivalents for each 4-hour Time Period from Operative Day (OR Day) to Postoperative day (POD) Two for Microlumbar Discectomy Patients (MLD).

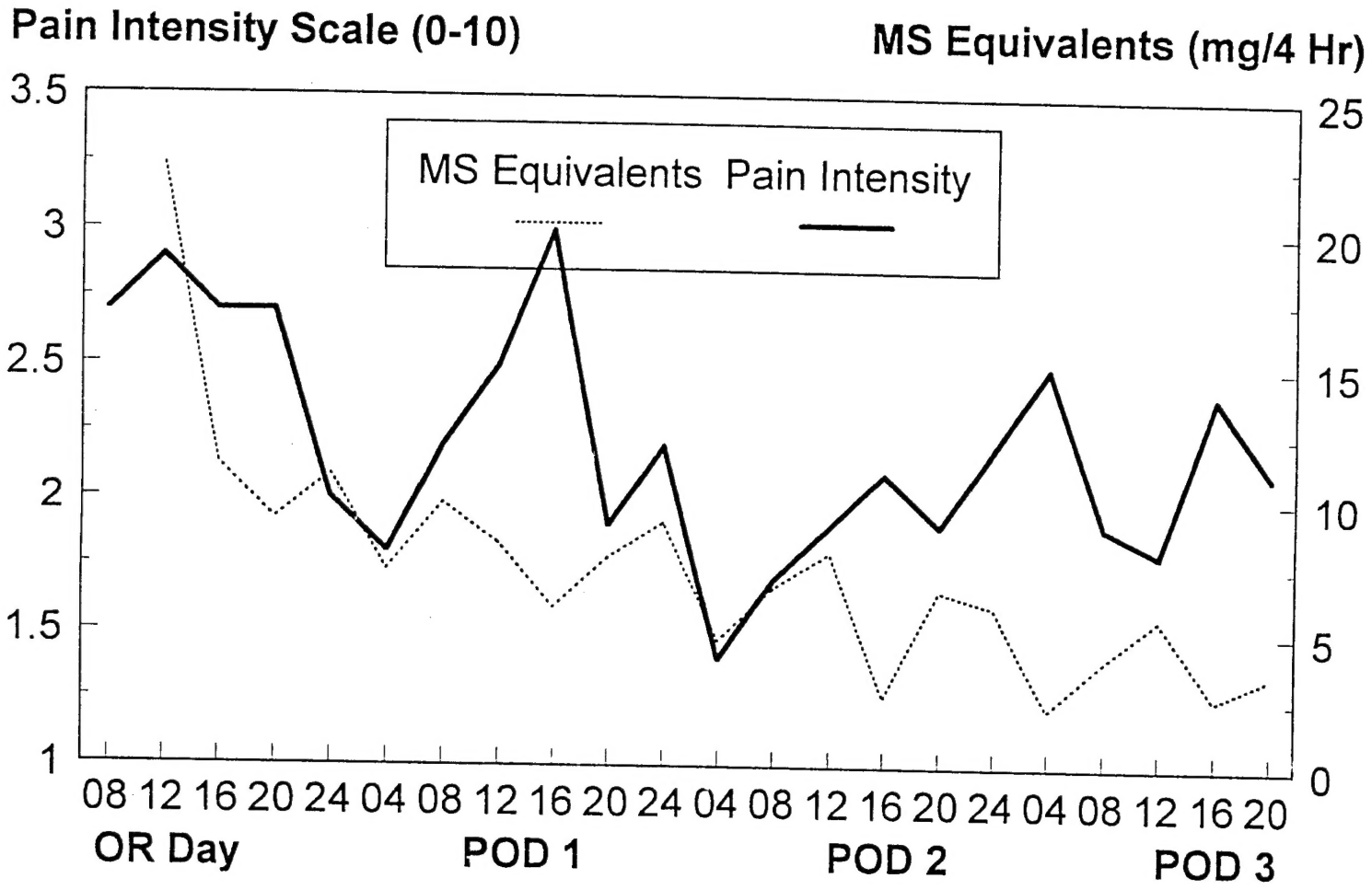


Figure 2. Numeric Rating Scale (NRS) Mean Pain Intensity Ratings Compared With Mean Morphine Sulfate (MS) Equivalents for each 4-hour Time Period from Operative Day (OR Day) to Postoperative day (POD) Three for Total Hip Arthroplasty Patients (THA).

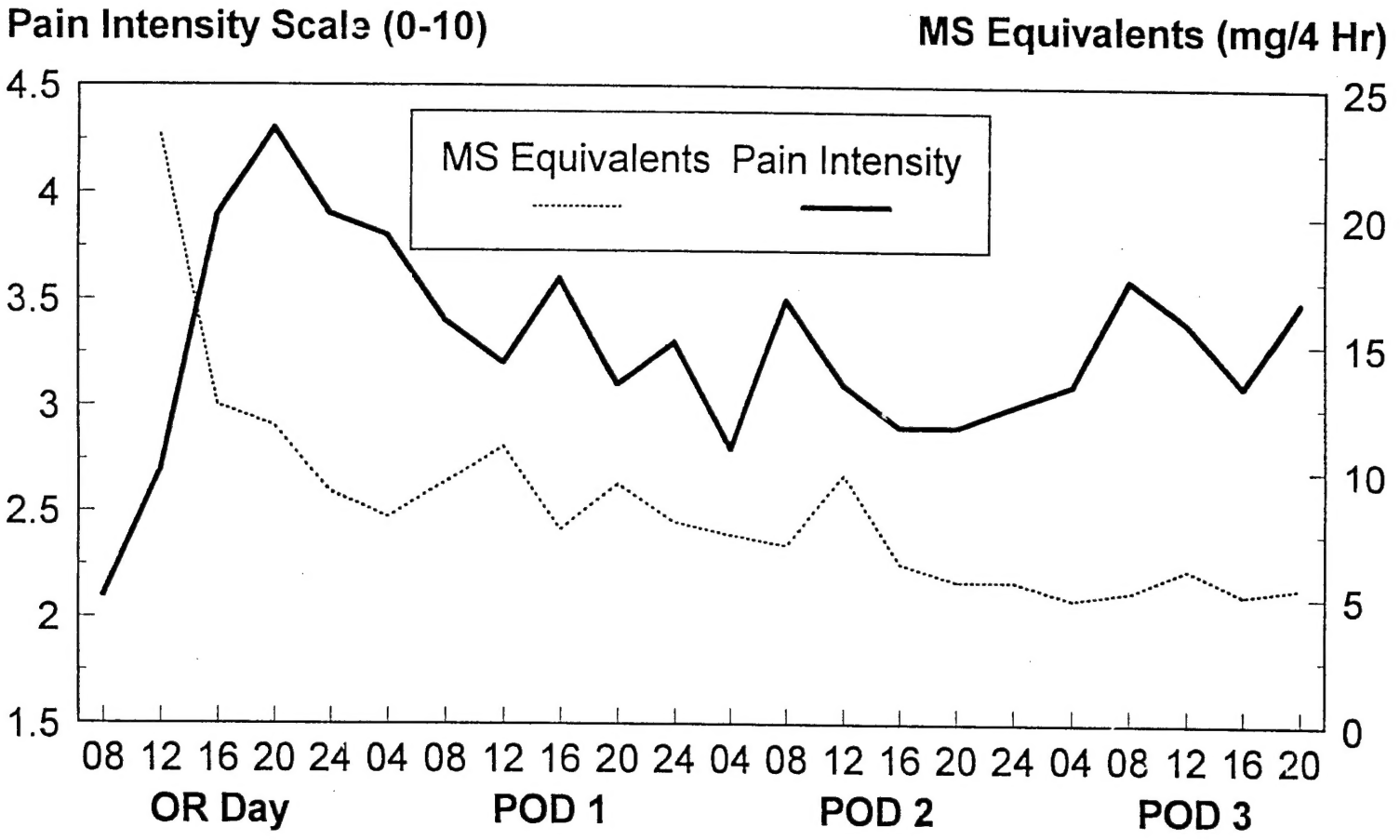


Figure 3. Numeric Rating Scale (NRS) Mean Pain Intensity Ratings Compared With Mean Morphine Sulfate (MS) Equivalents for each 4-hour Time Period from Operative Day (OR Day) to Postoperative day (POD) Three for Total Knee Arthroplasty Patients (TKA).

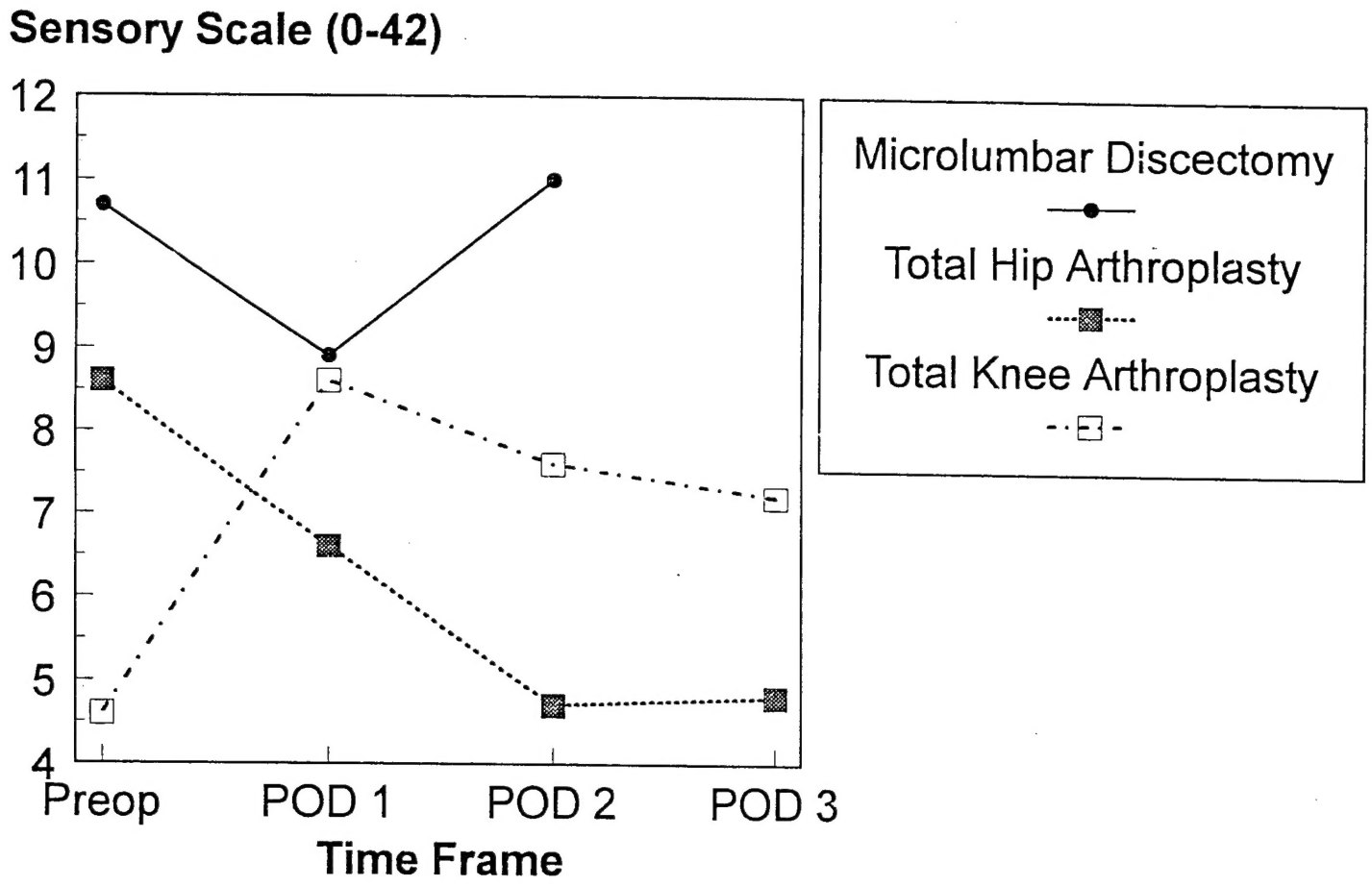


Figure 4. McGill Pain Questionnaire (MPQ) Mean Sensory Pain Ratings (PRIS) Preoperatively and the first Three Postoperative Days (POD) for Microlumbar Discectomy, Total Hip Arthroplasty, and Total Knee Arthroplasty Patients.

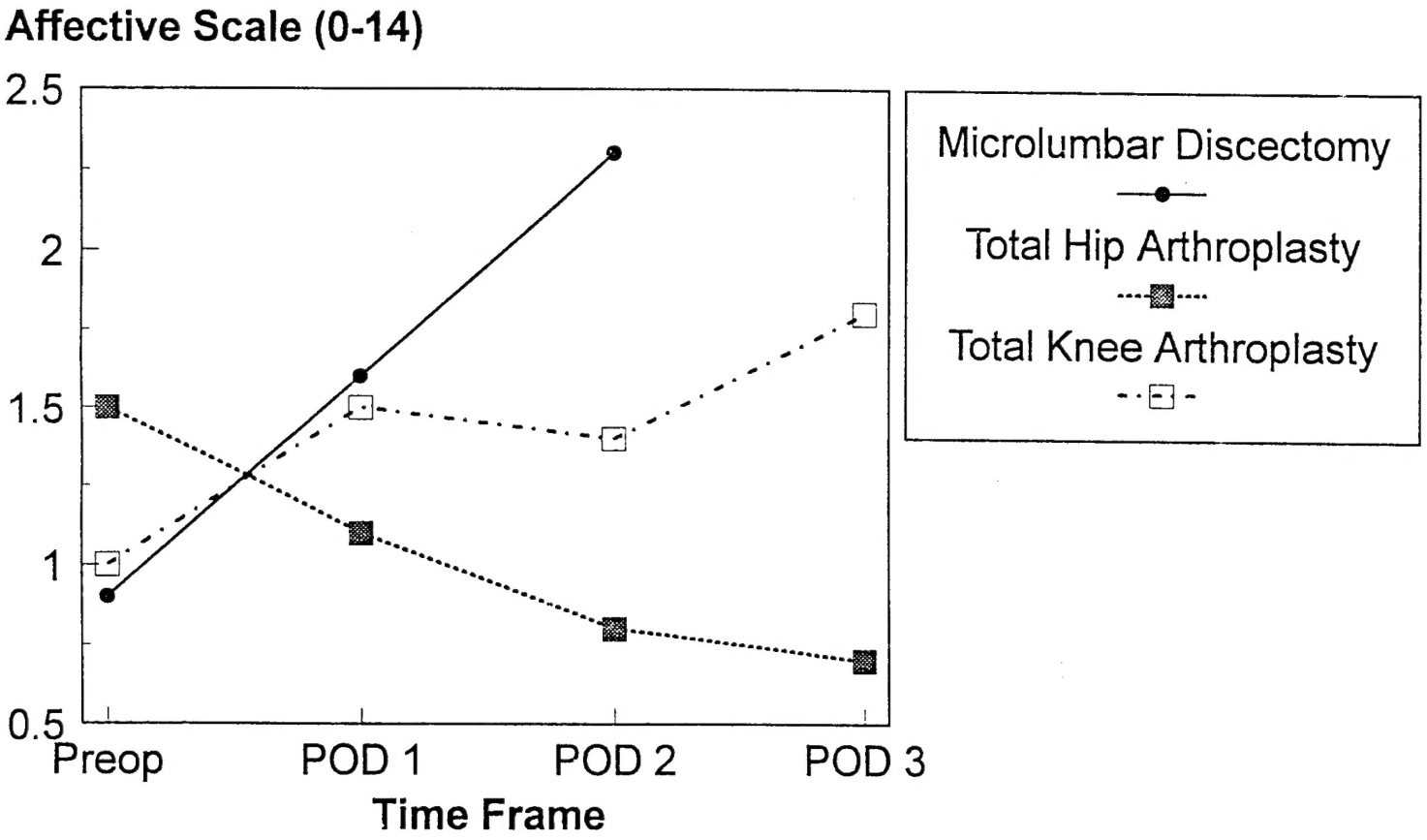


Figure 5. McGill Pain Questionnaire (MPQ) Mean Affective Pain Ratings (PRIA) Preoperatively and the first Three Postoperative Days (POD) for Microlumbar Discectomy, Total Hip Arthroplasty, and Total Knee Arthroplasty Patients.